MAY
29
1959

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

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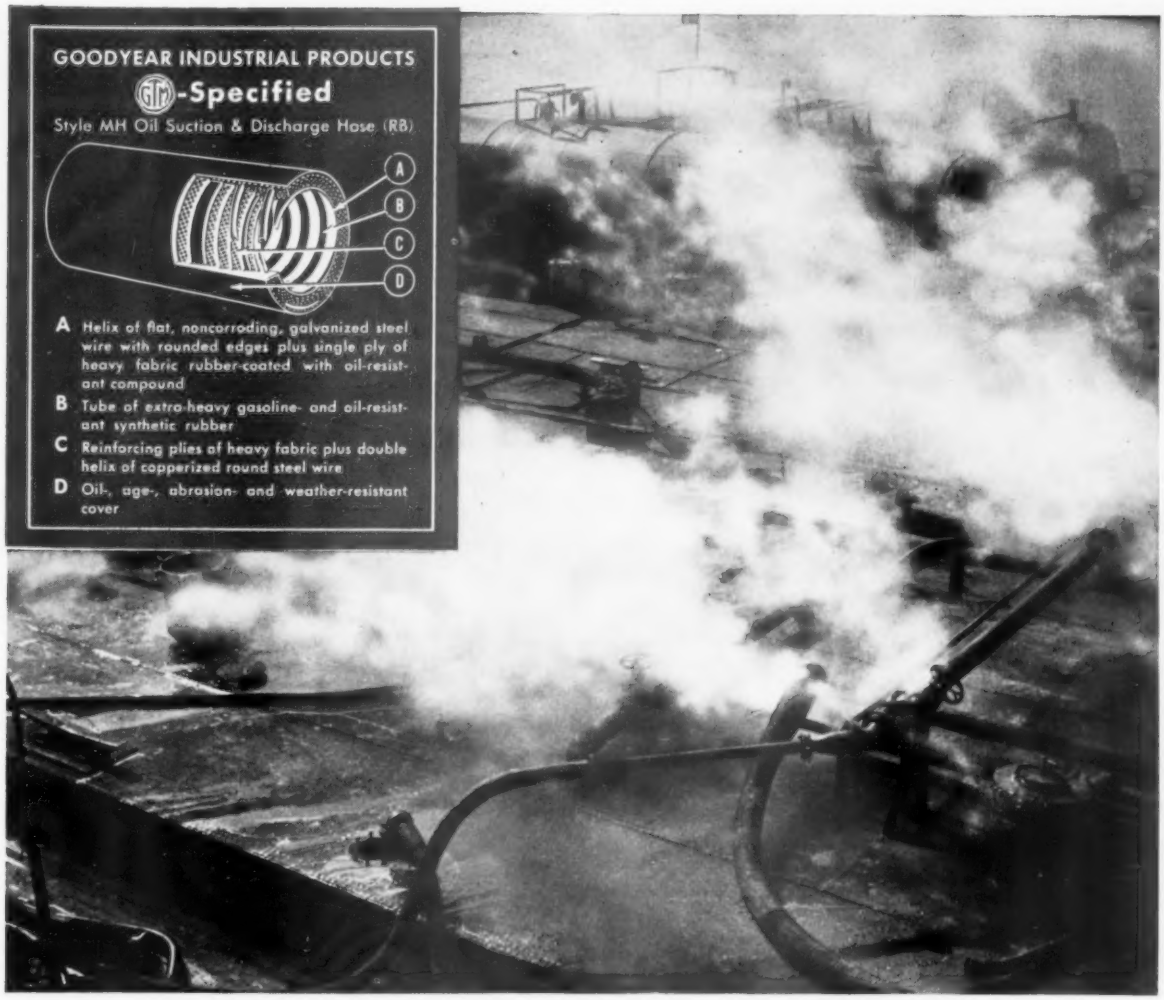
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G.T.M.-Specified
Style MH Oil Suction & Discharge Hose (RB)
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B
C
D
A Helix of flat, noncorroding, galvanized steel wire with rounded edges plus single ply of heavy fabric rubber-coated with oil-resistant compound
B Tube of extra-heavy gasoline- and oil-resistant synthetic rubber
C Reinforcing plies of heavy fabric plus double helix of copperized round steel wire
D Oil-, age-, abrasion- and weather-resistant cover

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The tides at this major Southern port are big ones—dropping tankers and barges 13 to 15 feet just while unloading. That subjects hose lines to a lot of *severe* twist and torque. They're constantly dragged over the rough wood and concrete docks. And the throbbing action of high-gallonage pumping adds still more abuse.

But the G.T.M.—Goodyear Technical Man—knew he had the answer to this rugged service in Style MH Suction and Discharge Hose. It's muscled with a rugged double helix of heavy steel wire for top resistance to crushing and kinking. Its super-tough cover shrugs off the most severe abrasion—is oil-, age- and weather-resisting, too.

How did it work? The G.T.M.'s hose *has taken 12 straight years of punishment—is still going strong.* In that time, it's handled gasoline, refined oil, propane, butane and crude oil. And the customer, impressed by its quality, has also ordered Goodyear steam hose for the barge-cleaning operation shown above.

Better, longer-lasting hose for *your* dock? There are over 800 types in the complete Goodyear line. For details on any one of them, contact the G.T.M. through your Goodyear Distributor—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

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INSIDE *Slant*

WORD USAGE QUESTIONED

A person can hear more than the normal number of complaints about the oil industry in traveling about the country.

One of the chief complaints is in the choice of words used by the industry.

Two words most commonly frowned on are:

Exploitation; and
Profits.

Both are used correctly by the industry, but the public looks upon them in a different light.

They turn to the dictionary when they think of exploitation, which the industry uses to mean "development."

But here's what the dictionary says:

"1—To achieve; perform.

"2—To utilize; to make available; to get value or usefulness out of; as, to exploit a mind or public opinion.

"3—Hence, to make use of basely or illegitimately for one's own advantage or profit; as, to exploit one's friends."

Wouldn't it be much better, from the standpoint of the public, always to say development instead of exploitation?

As for profits, which every business MUST have, a shift to the use of net income or revenue would sound much better to the public.

Think it over.

LeRoy Menzing
EDITOR

If you want the latest features

There is plenty out of the ordinary about this 368,000 gallon capacity pressure tank barge. Its piping system incorporates a hydraulic actuated fail-safe system whereby any breakage of the cargo hose during loading or unloading automatically secures the tanks. Also — a new type of liquid indicator level system *never used before*, a direct reading magnetic type instrument reading in feet and inches, was approved by the U. S. Coast Guard for installation in this barge. Avondale built it — in 60 days from date of keel laying.

Write for our complete brochure, *Marine Construction*

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Designed expressly for American Petrofina, the plan provides eligible employees with both Life and Major Medical Insurance. This protection helps an employee's family to overcome the financial crisis which may occur should he die or should he or a member of his family require extensive medical care.

New York Life has installed similar plans in thousands of organizations here and in Canada. To find out how a similar custom-made plan can be made part of your employee benefits program call your agent, broker or write direct.

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Annuities • Accident & Sickness Insurance • Pension Plans

Congrats and $25 for this quip to Mrs. Merlyn Goodman, Rt. 5, Box 742, Shreveport, La.

Looking into the future . . a major oil company engineer predicted 50,000 ft. wells by 1975. The world demand for oil and gas, with deeper wells, will mean a constantly increasing pipe production schedule by Lone Star Steel.
Joe Roughneck, heart of the oil and gas industry, knows he can depend upon Lone Star as a convenient source of supply for top quality API casing, tubing and line pipe.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.

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DEPT/Opinions

Views That

"Price is the all-important factor in this huge-volume, slender-profit business.

"One penny per gallon fluctuation in the price of the products that Sinclair expects to sell this year means a fluctuation of over $30-million in consolidated net income, after taxes."

—P. C. SPENCER
Chairman of the Board
Sinclair Oil Corp.

"We expect crude from new sources in North Africa soon to appear in volume in Free World markets, and, to a lesser extent, increased oil exports from the Soviet Union and its satellites. Competition and pressure on prices, therefore, seem likely to continue severe for some years ahead."

—ALBERT L. NICKERSON
President
Socony Mobil Oil Co.

"In contemplation of the many problems which face the oil industry at home and abroad, one is amazed by the behavior of our own Congress and governmental agencies."

—DAVID T. SEARLS
General Counsel
Gulf Oil Corp.

"It is certainly ridiculous to control imports and production to stop uneconomic waste of our oil reserves and, at the same time, allow the refiners to refine more products than can be economically absorbed by the market.

"Obviously, the evils of service-station price wars and commercial consumer raiding will continue to trouble the gasoline and fuel oil business until stable refinery conditions are restored."

—W. D. MACGILL, JR.
President
Virginia Petroleum Jobbers Assn.

"On this matter of oil supplies, it is worth noting that no one source of oil in the long run is indispensable. There is too much oil for that—in too many places—and too great a need for it. I suppose it must also be said that, while we trust the necessity will never arise, the Free World will undoubtedly insist there is one alternative it cannot accept, and that is an alternative to its own survival."

—WILLIAM R. STOTT
Director
Standard Oil Co. (N. J.)

"There's a certain fascination in matching wits with nature. But it takes more than fascination to put

Make News . . .

men to work looking for new oil reserves . . . Millions of dollars of costs are involved in the search for oil . . . No one drills dry holes just for the fun of it."

—John G. Pew
Vice-President
Sun Oil Co.

"The answer to products inventories lies in the hands of the refiners. They are not regulated by law, and they seem to ignore demand at times . . . The refiners hold the key to . . . whether the industry shall be strong. Overruns to stills can be the fire that will test the stability and strength of this industry. We trust that the fires in the stills of refineries will not tempt the refining heads to hamper this step in national defense. Surely national security outweighs gallonage in these perilous times of world tenseness."

—Gen. Ernest O. Thompson
Chairman
Texas Railroad Commission

"Canadian oil is the only oil which can reach the U. S. in time of war without traveling through submarine-infested waters, and any action which does not encourage the growth and maintenance of a strong industry in Canada is a blow to the North American concept of defense."

—W. Harold Rea
President
Canadian Oil Cos.

. . . and Letters

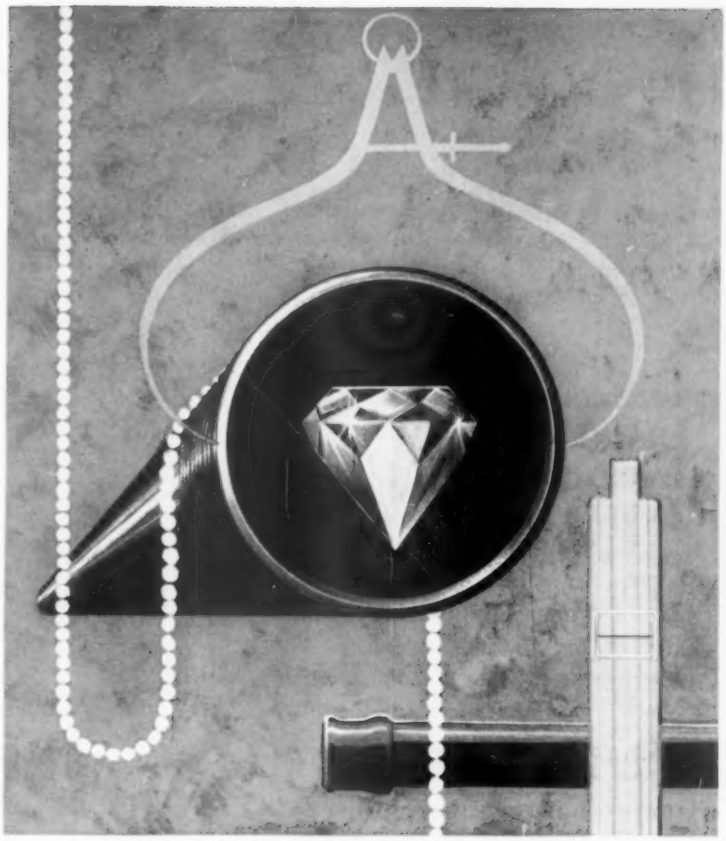
Dear Sir:

I believe your article, Inside Slant [PW—Apr.24'59,p3], would be of great help to many small independent producers to whom cost-cutting is a serious matter, particularly in drilling and completing wells.

A detailed case history of how it used to be done and how it is now being done would be most interesting and I am sure of great benefit to many like myself. At present I am interested in every manner of cost-cutting in shallow-well drilling and completion.

B. J. Owczykowsky, M.D.
Independent Producer
Natrona Heights, Penn.

Petroleum Week will publish reader comments each week. Address letters to LeRoy Menzing, Editor, Petroleum Week, 330 W. 42nd St., New York 36, N. Y.



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In the most modern steel plant in America, with the finest tools and equipment, Lone Star Steel craftsmen make a highly important specialty . . . fine pipe so vital to the great oil and gas industry.

Lone Star API casing, tubing and line pipe represents the best example of the art of pipe making . . . truly the gem of the oil and gas industry.

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WATCH OPERATING CYCLE COSTS DROP WITH CAMERON GATE VALVES

When you are buying a valve for water, oil, gas, or mud service, you are actually purchasing operating cycles. Most valves cost about the same, but when you add maintenance and repair costs to the purchase price, there is a real difference in the average cost per operation.

The easy-operating Cameron Gate Valve will perform more trouble-free operating cycles without maintenance or repair than any valve on the market today. The exclusive Cameron rotating seat principle makes this possible. Wear patterns change and extend the life of this unusual valve each time it is operated. Of course, operating cycle cost is low—by actual laboratory tests, lower than any valve for similar service. Cameron Gate Valves need not be removed from the line when repairs finally become necessary. A convenient sealing element package elimina tes expensive shop rep airs and gives you new valve operation in an abso lute minimum of down time.

Cameron Gate Valves are available in sizes from 2 to 6 inches and pressures to 15,000 psi. If you are called upon to specify or purchase valves in this range for water, oil, gas, or mud, you can save your company real money by giving us a call.

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60-Second Summary / WHAT'S HAPPENING IN OIL

May 29, 1959

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The House antitrust subcommittee wants oil pipelines divorced from integrated companies. Specifically, the group's Democratic majority asks Congress to bar pipeline dividends to shipper-owners. It also strongly attacks the Justice Dept. and Interstate Commerce Commission on pipeline regulation. . . . p 18

•

Cities Service is using an electrostatic desulfurizer to treat feed for a cat reformer at East Chicago. It uses spent sulfuric acid from alkylation as an oxidant. . . . p. 62

•

Tanker shipments of LPG from Venezuela and Saudi Arabia to world markets appear close at hand. Venezuelan exports to the U. S. will start soon. And an LPG refrigeration plant will be built at Aramco's Ras Tanura refinery. . . . p. 15

•

Two gas discoveries in British Columbia promise to open a new exploration area near Ft. Nelson. Production is from the Slave Point of the Middle Devonian, found at about 6,500 ft. . . . p. 25

•

While tankers are in long supply now, some experts say they would be short in a war emergency. They urge a shift in national defense policy to build more tankers. . . . p. 77

•

Deeper drilling, more offshore activity, and the rising trend of labor and materials are behind high drilling costs, a joint industry group has found. "Incremental" footage costs increase sharply with depth. . . . p. 19

•

Several companies want to explore "Sudan's Red Sea area now that the country has amended its oil law. The revision limits the government to a 50% share of profits. . . . p. 84

•

A turn to more fundamental research in the oil industry is needed. Experts say that particular emphasis should be given to improving oil-finding techniques. . . . p. 17

•

The Canadian side of Lake Erie is becoming a hot gas play area. Nearly 100 tests are now planned on 2.3-million acres of offshore permits. The southern Ontario industrial market provides an incentive. . . . p. 28

•

Auto drivers are going to be carefully analyzed by oil marketers. Panels of hundreds of consumers will keep detailed records of all retail purchases to get a line on buying habits. . . . p. 90

Up to the Minute / SIGNIFICANT LATE NEWS

AT-A-GLANCE PETROLEUM WEEK

May 29, 1959

A "historical" factor may be continued in crude import allocations for the last half of 1959. That's the indication this week, though the percentage factor could vary from the 80% of old voluntary allocations that was permitted for established importers during the first period of the mandatory plan, which ends June 30.

Mandatory controls so far have been "extremely effective" in reducing imports, Matthew V. Carson, Jr., administrator of the program, said this week. In the first 51 days of the plan, through Apr. 30, imports of crude and unfinished oil averaged 819,491 b/d, down 310,209 b/d from the level of crude and unfinished oils under the voluntary plan.

Finished product imports in April, the first full month of the plan, averaged 410,118 b/d, down 84,700 b/d from the average for all of 1958.

•

Only two companies—Gulf Oil Corp. and Standard Oil Co. of California—are interested in federal lands off southwest Florida. At a lease sale this week they submitted the only bids—on 23 tracts of the 80 offered. The companies bid jointly on 22 tracts, and California bid singly on one other tract. The total bonus bids amounted to $1,711,872 for 132,480 acres in the Marquesas area.

•

Jobbers have decided against taking their fight against major integrated companies to Washington, for the present. The National Oil Jobbers Council this week decided to "request the API to have a competent auditing firm study marketing profits of integrated companies." NOJC voted down a proposal to ask the Federal Trade Commission to make such a study.

•

An eighth discovery has been made in Libya. The latest is Gulf Oil Corp.'s No. 1 Emgayet, which flowed at the rate of 750 b/d of 35-gravity oil on a test from about 4,100 ft. It is being drilled ahead. It is located about 200 mi. south of Tripoli, in the midportion of a 7-million-acre block (No. 66).

•

Continental Oil Co. continues its expansion by acquisition—the latest in the Southeast. It is buying a Chattanooga (Tenn.) marketer, F. P. Kendall Oil Co., which operates 170 service stations in the southeastern states. Kendall's "Kayo" brand will be continued. Previously, Continental acquired an eastern fuel oil marketer, an Upper Midwest marketer and refinery, and an independent producer, and leased a southwestern refinery.

•

I. G. Davis will become senior vice-president and N. C. Simpson administrative vice-president of Gulf Oil Corp. June 1. Davis, who has been administrative vice-president and coordinator of production will become a member of Gulf's top executive group. Simpson, who moves to Pittsburgh, has been coordinator of domestic production in Houston.

gum formation can destroy a gasoline's good name... protect yours with Tenamene

Eastman gasoline additives

When buying gasoline additives, keep these three points in mind:

One, Eastman offers you every principal type of gum inhibitor in commercial use today.

Two, Eastman, as a basic manufacturer of the additives it supplies, maintains complete control every step of the way, assuring you of a uniform product and consistent additive performance.

Three, Eastman petroleum specialists provide on-the-spot service to make sure you obtain the most efficient use of the additives you buy. Ask them about cutting costs through bulk delivery.

You'll find Eastman petroleum specialists can give you unequalled technical service because inhibition of gum formation is their only interest. EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; Atlanta; Chicago; Cincinnati; Cleveland; Detroit; Framingham, Massachusetts; Greensboro, N. C.; Houston; New York City; St. Louis. **West Coast: Wilson Meyer Co.,** San Francisco; Denver; Los Angeles; Phoenix; Salt Lake City; Seattle.

A look at today . . . and a glimpse

Armour Chemicals for refinery applications

Where they work today

Every major phase of the refining operation can profitably use one or more of Armour's economical, cationic chemicals. Here are three typical applications for these chemicals: *hydrochloric acid inhibition, fuel oil additives* and *cationic asphalt emulsions.* We suggest you look into Armour's aliphatic organic compounds and see how they can work for you.

HCl Corrosion Inhibition

Armour Chemical announces a new corrosion inhibitor for hydrochloric acid—Armohib® 28.

This fatty-nitrogen-derived chemical is of particular interest to refiners for use during refinery clean-ups. It inhibits the HCl from attacking and pitting metal surfaces, yet it *does not* interfere with the cleaning action of HCl in removing scale or fouling deposits in processing equipment and boiler feed waters.

Armohib 28 has been proved effective in 5%, 10%, and 15% HCl solutions at temperatures ranging from ambient to over 200°F. It is non-staining, will not deposit a waxy surface on treated metal, and leaves surfaces bright and clean.

Tentative specifications

Activity	100%
Equivalents per gram (as titratable amine)	.00155
Flash Point	90° F
Pour Point	60°F
Solubility	
in HCl	Soluble
in water	Dispersible
in mineral oil	Soluble to 50%
in fuel oil	Soluble to 50%
Specific gravity	0.939
Physical appearance @ 25°C	Dark brown liquid

Armohib 28 effectively controls corrosion on 316 stainless steel, monel, bronze, and mild steel. It will not precipitate in the presence of ferric ions.

As little as 0.08% of the inhibitor in 10% HCl at 120°F has been proved effective, with the treated metal (mild steel) showing a weight loss of only 0.00470 lbs/ft²/day.

If HCl corrosion, pitting and/or foaming is your problem, investigate Armohib 28.

For more information, and test results, check "A" in coupon.

Fuel oil additives

One of the country's largest refiners recently evaluated a variety of organic compounds as fuel oil dispersant additives. Armour's cationic chemicals were found to be the most economical and effective sludge dispersants of all the additives tested.

The test consisted of circulating fuel oil containing a weighed amount of sludge through a fuel burner pump with a 100-mesh monel strainer. Comparative results were as follows:

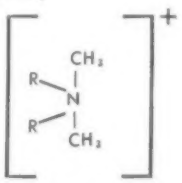
Typical Comparison Tests

	Chemical X (dispersant type additive)	Arquad 2HT	Arquad 2S plus Armolad F25
Cost/bbl.	1.0¢	0.6¢	0.8¢
Concentration	100 ppm	50 ppm	25-50 ppm
% Dispersibility	78%	94%	96%

Of all the different compounds tested, Armour's Arquads® (quaternary ammonium chlorides) were the most effective dispersants. Screen deposits in the test fuel oil/water system were reduced by 94%.

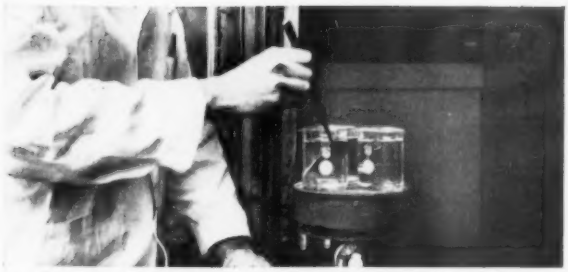
When the Arquads were combined with the Armolads®—Armour's series of inhibitor-dispersant type fuel oil additives—there was a noticeable increase of dispersing properties. Even with low concentrations of Arquads, the mixture was highly effective.

It is hypothesized that the cationic portion of the chemical mixture, i.e.,



combines with the insoluble gum or sludge to form a finely dispersed complex which allows the fuel to be cleanly burned.

These tests are of special significance to companies that store fuel oil for long durations in warm weather. In addition, these findings will help companies that mix different fuel oils in storage tanks, or that face



# of tomorrow

from Armour Chemical

the possibility of home consumers mixing different blends of #2 fuels.

Check "B" in coupon for detailed information on this test.

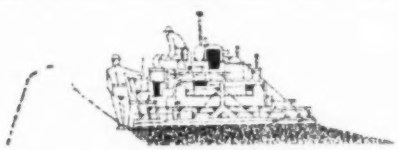
Cationic asphalt emulsions

Armour's high molecular weight amines have been proved highly effective for cationic asphalt emulsions.

These chemicals are ionized in solution and produce positively-charged asphalt particles. Since most surfaces are negatively-charged, the asphalt, when emulsified with Armour cationic amines, will deposit completely and irreversibly on almost any metal or mineral surface.

Research by Armour, several leading universities, and asphalt producers shows these new cationic asphalt emulsions to have several distinct advantages:

- They can be used in economical concentrations at a cost as low as 1.5¢ per gallon of asphalt emulsion.
- Asphalt from any crude source can be emulsified successfully.
- Asphalt sticks even to water-soaked aggregate for road building. Any water on the surface is displaced. This "plating out" action means road building can go on even during damp or wet weather.



- Cationic asphalt emulsions are not sensitive to "hard" water during processing and use.
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NEWS NOTES

New York. Armour Chemical's Petroleum Section and International Sales Department will present a combined display at the 5th World Petroleum Congress Exposition in the Coliseum. All the latest technical data and information will be available to visitors at the Exposition.

•

Washington, D.C. Two U. S. patents, #2,851,344 and 2,851,345, were recently issued to Armour Chemical for the manufacture of amphoterics (Zwitterions) for use as additives in fuel oil.

•

Akron, Ohio. Carbopol® 934, a new product of B. F. Goodrich Chemical Company, is providing more uniform, stable emulsions for various industries. In combination with Ethomeen® C/25, Carbopol 934 will produce, for example, a tar emulsion for use in roof coatings or sealer compounds.

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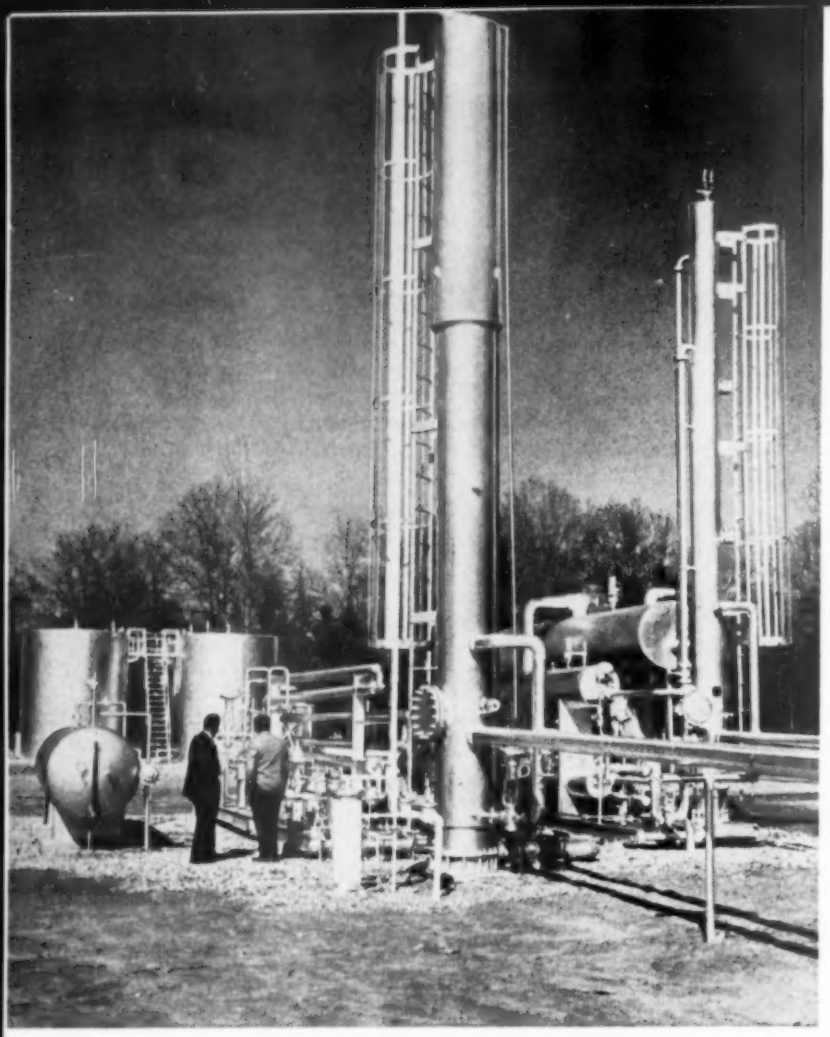
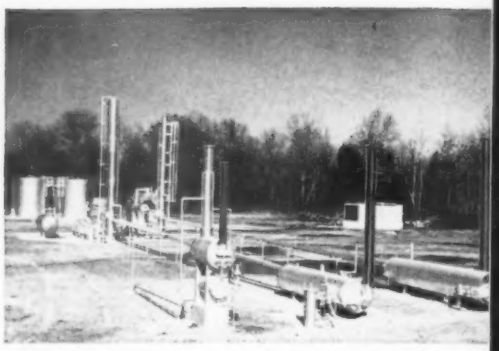
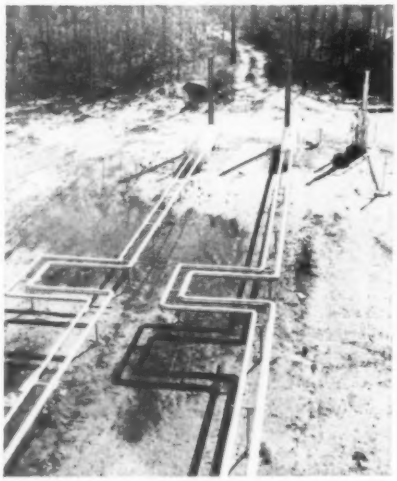




BS&B "COLD-FRAC" BOOSTS CONDENSATE RECOVERY BY 39%!



This BS&B 5GDH "COLD-FRAC" with a 25-ton BS&B Ammonia Absorption Refrigeration Unit, owned by W. E. Hall, H. M. Harrell, D. B. McConnell, et al, was recently put into service at Stinson #1, Sligo Field, Bossier Parish, North Louisiana. The unit is recovering slightly more than 74.5 bbls. of condensate per MMSCF D — an increase of over 39% from the 53.5 bbls. per MMSCF D recovered on standard separator test.

Operating conditions are as follows:

Flow	4.7 MMSCF/D
Inlet pressure	1350#
Inlet temperature	150° F.
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Low temperature separator	0° F.
GDH stock tank recovery	74.5 bbls. per MMSCF/D
Standard separator test (600# at 70° — stock tank recovery)	53.5 bbls. per MMSCF/D

Your nearby BS&B man will be glad to work out details with you on a similar installation tailored to your lease requirements. He reasons that profit for you is good business for him — put him on your team today!

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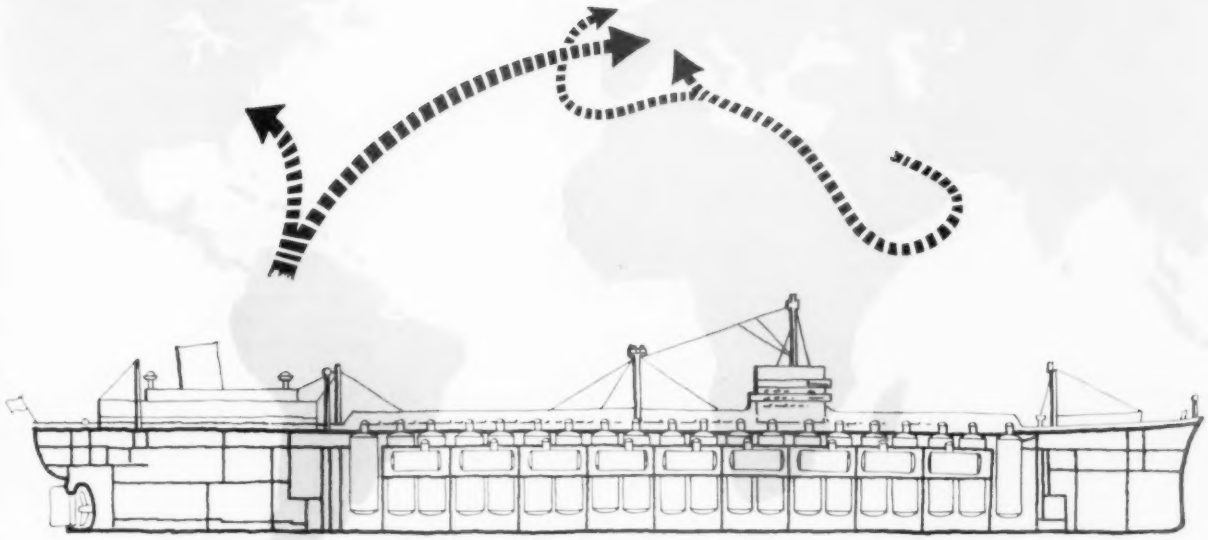
May 29, 1959



LPG Will Enter Worldwide Markets

Oilmen are now sowing the seeds for large-scale international trade in liquefied petroleum gas.

The more sensational recent developments in overseas shipment of natural gas have captured the industry's attention and imagination, but large transoceanic shipments of LPG now promise to have earlier and more certain impact the world over.

The first special LPG vessel of tanker proportions, the 35,000-ton Esso Puerto Rico, is now scheduled for delivery within 60 days.

The ship is currently being put through final sea trials by its Trieste (Italy) shipbuilder, prior to delivery to Panama Transport Co., of the Standard Oil Co. (N. J.) group.

The ship will be able to carry 75,000 bbl. of LPG—about twice as much as the largest existing LPG-carrying vessels—ships used almost exclusively in Gulf Coast-to-East Coast and Caribbean area service (PW—Jul.4'58,p27).

The Esso Puerto Rico will carry its LPG cargo in pressurized tanks, and will also carry crude.

The ship's owners have already scheduled the vessel for Venezuela-to-East Coast service.

It's now expected that the ship will average about 2 trips a month between Lake Maracaibo and New York harbor.

Creole Petroleum Co., another Jersey Standard affiliate, has just completed a natural gas liquids plant on Lake Maracaibo between La Salina and Tia Juana, which will supply the Esso Puerto Rico.

The new plant will be able to process up to 5,300 b/d of propane, 5,760 b/d of butane, and 6,070 b/d of natural gasoline. A good part of the plant's products are now being stored until the Puerto Rico goes into service; the remainder of the products are being used in LPG injection tests in Venezuela.

Actually, Panama Transport could have taken delivery of the Puerto Rico sooner, but LPG storage facilities at Esso Standard Oil Co.'s Linden (N. J.) refinery haven't been completed.

But LPG shipments to the U. S. East Coast appears to be just the start of large-scale international shipments to come.

The U. S. market isn't the most attractive for LPG imports, due to the limitations of mandatory import controls and to the availability of domestic LPG, which can be shipped to many areas by rail, tanker, barge, and pipeline.

Generally, domestic supply has been more than ample.

The big market exists in Western Europe, where petroleum demand continues to grow at a rate of about 10% annually, and where the LPG supply is limited.

The gradual rise of central heating in Europe, continued industrial expansion in many countries, and the demand of petrochemical plants add up to an attractive market for large-scale LPG shipments to the area.

One indication of the growing importance of LPG sales in Europe is Arabian-American Oil Co.'s start on a gas liquids refrigeration plant in Saudi Araba.

The planned facility, with a capacity to process 4,000 b/d, will be built at Ras Tanura. Completion is expected by Aug. 1, 1960.

Initially, the Aramco LPG plant

will process light ends from the Ras Tanura refinery. But later, the company plans to process natural gas in the plant.

The plans to keep LPG liquid by refrigeration at Ras Tanura indicate that new-type refrigerated tankers will be in service before long to European and other markets.

Until now, pressurization was considered the most economical method of keeping LPG liquid during long-distance over-water shipment.

The smaller ships now carrying LPG, as well as the new Esso Puerto Rico, rely on that method.

But last week, a member of one major oil company's tanker design and construction department told PETROLEUM WEEK that his company now feels a refrigerated LPG tanker is now "not only definitely feasible, but even preferable both technically and economically."

Such a tanker would carry the product at minus 45F. It would need heavy compressors, but would carry LPG in tanks far less expensive than the pressurized tanks on current LPG ships.

Several smaller, conventional-type LPG tankers are also under construction.

Marine Transport Lines, Inc., of New York, is now building a ship to carry 20,000 bbl. of LPG in Caribbean service. The ship is expected to be completed early next year.

And Gazocean, Inc., a French company, now plans a pocket-sized LPG carrier which will carry propane in pressure tanks and butane under refrigeration.

Furthermore, the current high tanker layup tonnage is making more attractive the conversion of conventional tankers to LPG service.

T-2s appear to be the best bet for such conversions because of their current low price. A T-2 was recently sold for about $250,000, near the all-time low.

One large international oil company is already said to be working on the conversion of a T-2 to a refrigerated LPG carrier.

Other majors are actively considering getting into this large-scale international LPG movement. Two companies say they have LPG tankers under active consideration.

The companies indicate that they may get into the business in any of several ways: by building their own special carriers; by conversions; or by chartering someone else's LPG tankers.

"We feel," one company official says, "that it's extremely important to get these LPG markets before others do. Right now, competition isn't too keen.

"But it will be in the future."

6,000 Expected for Oil Congress

Oil men the world over are converging on New York City for the Fifth World Petroleum Congress & Exhibition.

The Congress & Exhibition gets under way at New York's Coliseum this weekend and extends through June 5.

About 6,000 oil men—nearly twice the number that attended the 1951 and 1955 World Petroleum Congresses at The Hague and Rome, respectively—are expected to attend the first such international meeting to be held in the U.S.

Registration will start just as the API's refining meeting, also in New York, ends.

The Congress will hear of the latest advances in every phase of the industry as developed by operating men in all parts of the world. Some 285 papers on oil's progress will be delivered during the week.

The program is divided into nine technical sessions plus one symposium. Papers for the Congress were selected by committees in various countries from more than 500 proposed.

In exploration, emphasis will be on current and future geological and geophysical methods. A large foreign contribution is scheduled.

In drilling and production, reservoir operation, secondary recovery, and underground combustion will get heavy attention.

In processing, particular emphasis will be given to isomerization, cat reforming, and hydrogenation.

In transportation, LPG and liquefied methane tankers and pipeline automation will be covered in detail.

Other sessions will deal with petrochemicals; testing; utilization of oil products; engineering; operations research; and the application of atomic energy to petroleum.

Just as important as what is to be heard at the Congress is what will be seen—an almost limitless range of new equipment designed to help shape oil's operating future.

More than 200 manufacturers and engineering companies serving the petroleum and petrochemical industries will be showing oil men their latest wares at the Coliseum concurrent with the Congress.

Exploration equipment will include many types of new instruments.

Oil field equipment will center around new drilling and pumping machinery, drill rig instrumentation, and meters, pumps, and boilers.

Processors will be shown new refining instrumentation, data processing equipment, new heat transfer equipment, and new catalysts.

Pipeliners will see the latest in remote-control equipment.

Bender Named PW Processing Editor

Rene J. Bender has joined the staff of Petroleum Week, as editor of the Processing & Petrochemical Dept. A graduate of the "Ecole Centrales des Arts & Manufactures" of Paris, France, Bender is a veteran in the oil business.

After several years spent as combustion engineer for Babcock & Wilcox Co. and for Combustion Engineering Corp. in the U.S. and abroad, Bender joined Sinclair Oil Corp. in 1932 in Chicago.

He remained with that organization until 1957. His duties, as an engineer, a fuel oil sales manager, a public relations representative, took him to the East Chicago refinery of Sinclair, the New York home office, and Ethiopia.

During World War II, Bender was on active duty as a U.S. Naval officer.

He became part of a group, the Naval Technical Mission to Europe, which entered Germany long before V-E day, to interrogate German technicians about their latest developments in synthetic fuels, lubricants and petrochemicals.

He is a member of many professional groups, including the American Society of Mechanical Engineers, the Society of Automotive Engineers, the American Society of Lubrication Engineers, the American Petroleum Institute, and the Societe des Ingenieurs Civils de France.

More Petroleum Research Is Needed

This week, top research officials looking at the future of the oil industry spelled out some of the most urgent problems* that should be solved.

The continued growth of the petroleum industry in its second century will depend largely on the results of its research activities—both fundamental and applied.

The need for increased research activities applies across the board in the industry—from oil-finding to end-product development. That's the opinion of some of the research officials of leading companies.

At this week's midyear meeting of the API's Division of Refining, in New York, several research experts took a long look at future needs from the industry's research laboratories. Here's what they say is required:

***In oil-finding,** "what is needed is a dramatic increase in efficiency by reducing costs and by strengthening our technology . . . Fundamental research may not be the answer to our immediate problems, but without it there is not much chance of a real breakthrough."

That's the prediction of T. J. O'Donnell, of Gulf Research & Development Co., Pittsburgh.

Technical advances do not come cheaply, he warned, and they do not come easily, especially when "we are rapidly using up our fund of basic scientific knowledge."

Most research is under strong pressure to produce immediate practical results, he commented. In the case of geophysics, O'Donnell noted, research has been slanted heavily toward the development of techniques and instrumentation.

And while a lot has been achieved, he said, fundamental research in pursuit of new knowledge has lagged.

"Exploration geophysics has, more or less, reached the point at which further progress depends on acquiring new basic knowledge," O'Donnell said.

***Also in exploration,** "our present methods would be pretty good if we knew more about using them."

Learning more about existing methods, O'Donnell observed, will require research. "We have developed sophisticated techniques for acquiring data but only a fractional capability of converting data to information.

"We are not able to extract all the information contained in the seismic record."

Seismologists, he noted, tend to call the reflections the "signal" and all else on the record "noise," although much of the noise "contains information, if only we knew how to use it."

Interpretations of subsurface data must be qualified with such words as "possible," "doubtful," or "weak evidence," he explained. "Even at best, we are able to extract only a small part of the information content of this data."

***In motor fuels,** "economically justifiable methods of making fuels to satisfy the combustion and other requirements of engines having higher compression ratios than those now being produced probably will be devised."

That's the belief of W. J. Sweeney and J. F. Kung, of Esso Research & Engineering Co., Linden, N. J.

They said that substantial gains in thermal efficiency can be realized by raising the compression ratio of engines above the current maximum levels of approximately 10.5 to 1. And there's good reason to believe, they commented, that if the compression ratio of spark-ignited engines is raised substantially above present levels, serious surface ignition and compression ignition problems not amenable to correction by simply raising antiknock quality will be encountered.

Despite the current interest in gas turbine engines, they predicted that the widespread use of turbines in automotive vehicles "does not appear to be imminent."

As demands for motor gasolines of still higher antiknock quality than those currently available develop, the two research officials predicted that increased use will be made of: (1) solvent extraction of catalytic reformates to remove nonaromatics, (2) reprocessing of heavy catalytic naphthas to remove paraffins and olefins, (3) molecular sieving of virgin naphthas to remove normal and lightly branched paraffins, (4) isomerization of selected virgin naphtha fractions, and (5) alkylation of light olefins.

***In lubricating oils,** the "requirements will become more difficult to meet and will probably be caused by bigger, more powerful, and more efficient engines."

That's the estimate of Arthur L. Lyman and F. W. Kavanagh, of California Research Corp., Richmond, Calif.

Diesel engines, they predicted, will tend to require higher dosages of more potent additives, due to the use of turbochargers, which increase severity by increasing back pressure, and use of more powerful engines operating at higher temperatures.

In gasoline engines, Lyman and Kavanagh predicted, the emphasis will be on lubricants for higher speed, better breathing, and more powerful engines.

The two California researchers noted that the improvements to lube oils in the past decade have come "almost entirely from improved use of additives. The refining processes to make the base stocks were developed earlier. They produce excellent stocks, and there is little incentive to improve them."

***In petrochemicals,** "the growth rate is slowing down . . . and growth will be only as fast as the markets for existing products increase and new petrochemicals for new uses are brought to market."

The emphasis will probably be on the latter, predicted J. H. Forrester, of Amoco Chemicals Corp., Chicago.

"The precentage growth on an annual basis is expected to be considerably less than that of the past decade; an annual growth rate for petrochemicals of 8% to 10% is my best guess for the coming decade," Forrester said.

Oil and gas consumption for petrochemicals in 1958, he noted, accounted for no more than 1.7% of total petroleum demand. "But the important point is that the dollar value of this 1.7% of total demand is much greater as petrochemicals than as petroleum fuels and lubricants."

Does Celler Want to Divorce Pipelines?

That's the indication from the antitrust subcommittee majority report, which asks Congress to bar dividends to shipper-owners of common-carrier lines.

Renewed attacks on common carrier pipelines this week could be another step leading toward an eventual divorcement suit.

Such a divorcement action has been an apparent target of the Justice Dept. for at least two years (PW—Nov.15'57,p23), based on suits filed during that period against four pipeline companies and continuing investigation of other, earlier suits.

But now a much broader charge has been leveled against the entire pipeline branch of the industry.

The House antitrust subcommittee this week issued its long-delayed report on government consent decrees to end antitrust suits demanding that oil pipelines be barred from paying dividends to shipper-owners.

The subcommittee, a unit of the House Judiciary Committee, is headed by Rep. Emanuel Celler (D., N. Y.). Its 379-page report was based on hearings held in 1957 concerning the Justice Dept.'s consent program under the Elkins Act of 1903.

The hearings, according to Celler, were held to determine two things: Are companies complying with the consent decrees, and is the Justice Dept. adequately enforcing the provisions of the decrees?

The prime subject in the investigation was the government's enforcement of the 1941 consent decrees involving 52 pipeline companies owned by 20 major oil companies.

The government's original charge against the pipeline companies was that they were violating the Elkins Act, which, as amended, was designed to strengthen the antirebate provisions of the Interstate Commerce Act.

The resulting consent decree was drawn under pressure from the Secretary of the Interior Harold L. Ickes, who, despite the Justice Dept. charges against some of the companies, wanted pipeline companies to cooperate to build what later became the government-financed War Emergency Pipelines.

The decree permitted shipper owners to get dividends not to exceed 7% of the valuation of pipeline properties. (The Interstate Commerce Commission had recommended that dividends of 8% should be allowed on crude lines and of 10% on product lines.)

The subcommittee's Democratic majority report condemns the actions of the Justice Dept. and the Interstate Commerce Commission, as well as the oil industry.

Four of the six Democrats on the subcommittee signed the report. In addition to Celler, they were Peter W. Rodino, Jr. (N. J.); Lester Holtzman (N. Y.); and Herman Toll (Pa.)

The majority report made these basic changes:

- **The Justice Dept. has failed to require pipeline "defendants" to comply with the consent decree's provisions**—thus making it ineffective "even within the limited area to which it applies."

It continued: "It is beyond dispute that the record of the Dept. of Justice, in its efforts to enforce the oil pipeline consent decree, is bad."

The Justice Dept., the majority report said, had no right to agree to the decree.

- **"The oil pipeline industry has been able to use the ICC as an instrument for protection against the requirements of the . . . decree."**

The majority hit strongly at ICC's handling of pipeline companies. Pipeline companies, the Celler group said, have achieved a position of self-regulation.

"Over a period of 40 years," the report said, "the industry established close working relationships with the staff of ICC and its commissioners responsible for oil pipeline regulation. This industry-government relationship was such that oil pipeline personnel directly participated in the government's regulatory operations. Personnel from the carriers worked in ICC offices to prepare records and recommendations that were essential to ultimate ICC determinations."

During the hearings, considerable argument developed over ICC's evaluation method. Subcommittee lawyers contended at one point that a 1934 evaluation by ICC of pipelines was the proper "latest evaluation" as required in the consent decree, rather than a more up-to-date 1947 valuation that had been completed by ICC in 1950.

- **"Ownership of oil pipelines in 1958 continues to afford the major integrated owners substantial advantages over the other segments of the petroleum industry."**

"Elimination of rebates [dividends], the majority reported, "would reduce the competitive advantages now enjoyed by the major integrated oil companies."

Pipeline companies are specifically authorized to pay dividends to shipper-owners under the decree, and under the terms of the decree are under the jurisdiction of the Justice Dept. on such payments.

A Republican minority report said that the demands of the subcommittee's Democratic majority for elimination of dividends would force "divorcement" of pipeline ownership.

The three minority members—Reps. William M. McCullough (Ohio), William E. Miller (N. Y.), and George Meader (Mich.)—accused the Democratic majority of trying to make antitrust hay, but of getting only "much chaff with very little wheat."

"The feasibility of such [dividend-prohibition] measures, or the real necessity for them, was not considered at the hearing," the minority report said. It accused the majority of making recommendations completely outside the scope of the original hearings.

The Republican members also challenged the majority view that the Justice Dept. took no action on Elkins Act cases until the subcommittee announced its investigation. (The government started litigation in 1957 against Texas, Tidal, Service, and Arapahoe pipeline companies. The government lost all cases in district court, and subsequently settled three. The Arapahoe case is pending before the U. S. Supreme Court.)

"The implication is that the Dept. of Justice acquiesced in the payment of discriminatory rebates to shipper-owners of the major pipelines and acted only when forced to by the committee," the minority group said.

GOP members also claimed that the 1941 consent decree was so ambiguous that it complicated the enforcement problem that Republicans inherited from a Democratic administration.

But the minority agreed that there was "cause to question" why for 16 years no measures were introduced in court to get an interpretation of the decree.

Instead of legislation, the minority recommended a reopening of the hearings to determine whether the

Attorney General's administrative powers need modification and definition.

"Nowhere in the record," the minority said, "is there any evidence that oil companies should be forced out of the common carrier business."

Charges by the Democratic majority of the subcommittee that the Justice Dept. has been lax in its enforcement of the consent decree struck many in the industry as contrary to the facts.

In addition to the four suits for Elkins Act violations filed in 1957, the Justice Dept. last year, in its annual report on the operation of the Interstate Oil Compact (Page 22), indicated that a broader antitrust suit against pipeline companies was in the making. It said:

"The anticompetitive possibilities inherent in the control of transport facilities by major companies has long been recognized . . .There are at least some indications that pipeline operation has since developed true common-carrier capabilities, sufficient to permit independent operation."

The committee for Oil Pipe Lines, in Washington, said nothing in the Celler hearings substantiates the majority recommendation.

Gordon Locke, general counsel for the committee, said changes in the Elkins Act were not within the announced scope of the hearings and were not covered in testimony. Nor, Locke said, did the pipeline industry have opportunity to offer testimony on the act.

"The alleged monopoly power does not exist either in theory or in fact," Locke said. "It remains the fact that pipelines are subject to ICC regulation on rates and requirements to render service, that only six rate cases have been heard by ICC in some 35 years, and that no substantial complaint on service has been received in recent memory."

"If thousands of independent producers and refiners had any complaints against pipelines, it is apparent that ICC would have such knowledge," he added.

For despite widespread charges by independent producers in some Texas areas in 1957 that major buyers of crude had a "strangle hold" on their markets, none filed charges with ICC.

The recommendations of the partisan majority report—even in a Democratic Congress—do not have any early chance of adoption, most observers believe.

The Celler report is not expected to be accepted without serious question by Democratic leaders.

Deep Drilling Hikes Costs

Deeper drilling, increased offshore activity, and the rising trend of wages and materials are the primary factors behind soaring U.S. drilling costs.

This conclusion was reported this week in a joint study made by the American Petroleum Institute, the Independent Petroleum Assn. of America, and the Mid-Continent Oil & Gas Assn.

The joint study, the second by the three associations, covered drilling costs in 1955 and 1956. The earlier report was based on 1953 data, and was published in 1955.

Extreme depth has the greatest influence on over-all drilling costs, with total cost of holes over 15,000 ft. running 29 times the costs of those in the 2,500-3,750-ft. range.

Total costs of 150 producers and dry holes drilled to more than 15,000 ft. in 1956 averaged $761,700 each, compared with $26,500 per hole for those drilled to depths between 2,500 and 3,750 ft.

Perhaps even more striking is the sharp jump in "incremental costs" of the very deep holes, compared with those in the next-deepest bracket.

Based on producers only, the study found that 499 wells drilled to depths of between 12,501 and 15,000 ft. (averaging 13,440 ft.) were completed at an average cost of $394,900. Of 79 producers drilled to depths greater than 15,000 ft. (averaging 16,100 ft. per hole), the average cost was $804,900 each.

The difference in the average depths of the two classes—2,660 ft.—raised the average well cost by $410,000, or $154.10 per incremental ft.

Increases in costs between each depth bracket move up sharply, with completion costs in each bracket almost doubling, on the average, the cost of completing holes of the next lower depth range.

The sharp rises start at depths that are considered extremely shallow by today's drilling standards.

For example, the average costs of holes drilled between 1,251 ft. and 2,500 ft. are 104% greater than those less than 1,250 ft.

And a hole in the range from 12,501 to 15,000 ft. costs 206% more than those in the 10,000 to 12,000 ft. bracket.

Over-all drilling costs of producers and dry holes in 1956 averaged $50,200 a hole, or $12.35 a ft., a rise of 8% over the preceding year.

Productive wells, on the average, cost $55,600 to complete, or $13.64 a ft.—drilling and equipping through the Christmas Tree at the wellhead. This cost figure excludes administrative overhead and outlays for additional equipment, such as pumping units, gathering lines, and lease facilities. It also excludes lease rentals and exploration expenses prior to drilling.

Dry holes in 1956 cost $41,600 on the average, or $10.26 a ft.

Offshore producers in the Gulf of Mexico cost about nine times as much to complete as those on land.

Successful wells offshore cost $415,000 on the average in 1956, compared with $47,100 for wells drilled in other areas. Several offshore ventures completed in 1956 cost more than $1-million each.

Drilling expenditures in offshore areas in the Gulf accounted for 6.9% of all drilling expenditures in 1956. But the footage drilled offshore amounted to only 2% of the total drilled.

Since the joint drilling study was made, however, there have been some indications that the gap between onshore and offshore costs is narrowing.

One of the big reasons is that in the most-recent years, the trend offshore has been to more development than exploratory tests.

This has resulted in an improvement in the net cost of developing reserves offshore.

The steady increases in both wages and materials costs during the postwar years have added substantially to drilling costs, and the prospects are for further increases in 1959.

The negotiations between steel companies and the Steelworkers Union point to higher steel prices after July 1, due to the expectation that labor will win a wage hike.

The higher prices will hit steel, the major material used in drilling, and a wage rise will bring more pressure for another round of oil labor wage increases on top of the overall 5% wage boost of last January.

The joint association study noted that average wage rates in the production branch of the industry rose 6.9% between 1955 and 1956. And 1958 production wages averaged 8.5% more than in 1956.

The average price of some oil steel items in 1958 was as much as 15.7% above 1956.

Over-all steel items used by the oil industry increased by $12.50 to $22.50 a ton in 1957, and by $7 to $10 in 1958.

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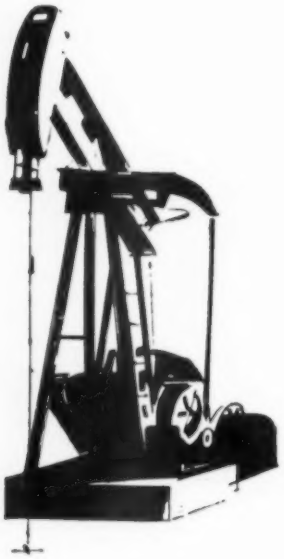

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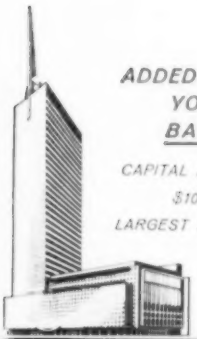

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What's New / IN THE INDUSTRY

Purchasing electric power for a refinery has many advantages, according to Russell W. Mills, of Standard Oil Co. (Ohio). The company saved $200,000 in capital investment and "more than that" in yearly power costs, Mills told API's Division of Refining meeting this week.

•

Service Pipe Line Co. and Kerr-McGee Oil Industries, Inc., are exchanging Oklahoma gathering systems in Seminole, Pottawatomie, and Creek Counties. Service will transfer to Kerr-McGee 53⅓ mi. of gathering lines serving 102 leases which produce about 1,180 b/d. McGee will transfer to Service about 48⅓ mi. of lines serving 107 leases which produce about 1,100 b/d.

•

Kansas will make the first cut in its crude allowable in seven months, but Louisiana will permit a slight rise. The Kansas permissible for June was set at 324,000 b/d, off 3,000 b/d from May. In Louisiana, the Conservation Commission continued its March, 1953, depth bracket formula, which will result in an allowable of 888,708 b/d, up 3,132 b/d to cover new production.

•

A 279-mi. products pipeline will be built from southern Kansas to serve northern Nebraska and South Dakota. Kaneb Pipeline Co. is expanding its 6-in. system with a 111-mi. line from the Cooperative Refinery Assn.'s plant at Phillipsburg, Kan., to Kaneb's Fairmont Terminal, near Geneva, Neb., and a 168-mi. line from the terminal to Yankton, S. D.

•

Cities Service Oil Co. has opened its 20,000 b/d Canadian refinery at Trafalgar Township, 30 mi. west of Toronto. It is the major phase of a $40-million expansion program in Ontario and Quebec.

•

Phillips Petroleum Co. and Sunray Mid-Continent Oil Co. will join the search in Australia. They will drill a 6,500-ft. test on the south Moreton anticline in Queensland for an undivided half interest in a 29,500-sq mi. concession held by Lucky Strike Drilling Co.

•

Oversupply will adversely affect second-quarter earnings and, if not corrected soon, those of the third quarter. That's the prediction Frank O. Prior, board chairman of Standard Oil Co. (Ind.), made before an economic conference of the National Industrial Conference Board last week. Because of oversupply, he said, the continued rising trend of demand has not produced results as good "as they should be." Demand for domestic crude in the last half of 1959 should run about 8% over the last six months of 1958, but because of product stocks "higher than is healthy," refinery runs in the last half should be held below present levels.

•

Thomas C. Barger has been elected president of Arabian American Oil Co. Norman Hardy, president since 1958, was named chairman, succeeding Fred A. Davies, who is retiring. Hardy will continue as chief executive officer.

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Looking Ahead in Washington

McGraw-Hill
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May 29, 1959

AT-A-GLANCE PETROLEUM WEEK Copyright

The Justice Dept. may force an unexpected squabble in Congress over extension of the Interstate Oil Compact. Until recently another four-year extension of the pact by Congress appeared to be a foregone conclusion, without a wrangle through lengthy hearings.

Antitrust lawyers want Congress to drop a requirement that the Justice Dept. make annual reports on the Compact, or at least that is what Assistant Attorney General Lawrence Walsh asked in a letter to the House Interstate Commerce Committee last week. One of Walsh's reasons was that the antitrust report on the oil Compact hampered the government in litigation against oil companies. Another view is that the Justice Dept. may want Congress to look into the Compact again—particularly oil company participation in Compact committee activities.

•

The Justice Dept. opposed the report from the beginning. Herbert Brownell, Attorney General in 1955, said he did not think the department should be required to check up on the Compact's activities. But a group of consumer-state lawmakers, led by Sen. Paul Douglas (D., Ill.), pushed through the requirement for an annual report. Oil-state congressmen did not vigorously oppose the Douglas amendment, and so it was adopted.

Congress authorized only $25,000 a year for the antitrust report—much less than the Justice Dept. asked. In 1956, the House passed an appropriations bill which included more than $700,000 for the Justice Dept. to spend on the Compact report. The department planned to hire more than 100 additional employees to work on the project. Senate Majority Leader Lyndon Johnson (D., Tex.) said it was a "ridiculous request" and made sure Brownell did not get the money he sought. After a House-Senate conference, the Justice Dept. got only the $25,000.

Sen. Douglas suspected the department of trying to avoid the report requirement by asking a large appropriation. Douglas, author of the report amendment, called Brownell's request "absurd," and accused the Justice Dept. of trying to kill any effort to carry out the amendment's "reasonable" request.

The Justice Dept. learned to work with a small amount of money, however, and issued three reports. The fourth report is due in September, unless Congress drops the requirement. In the initial report, Brownell complained that he was unable to prepare "adequate and useful reports" because of the lack of money. In the 1958 report, Attorney General William Rogers indicated that he was considering whether pipeline ownership should not be separated from shippers.

•

Now, consumer-state congressmen are pressing to force the Justice Dept. to continue the reports. In the House, Rep. Torbert McDonald (D., Mass.), a member of the House Interstate Commerce Committee, and other northern and eastern representatives, say they will oppose the Justice Dept.'s bid to omit the antitrust report. When the Compact extension bill gets to the Senate, Sen. Douglas and others also are expected to be critical of the Justice Dept.'s stand.

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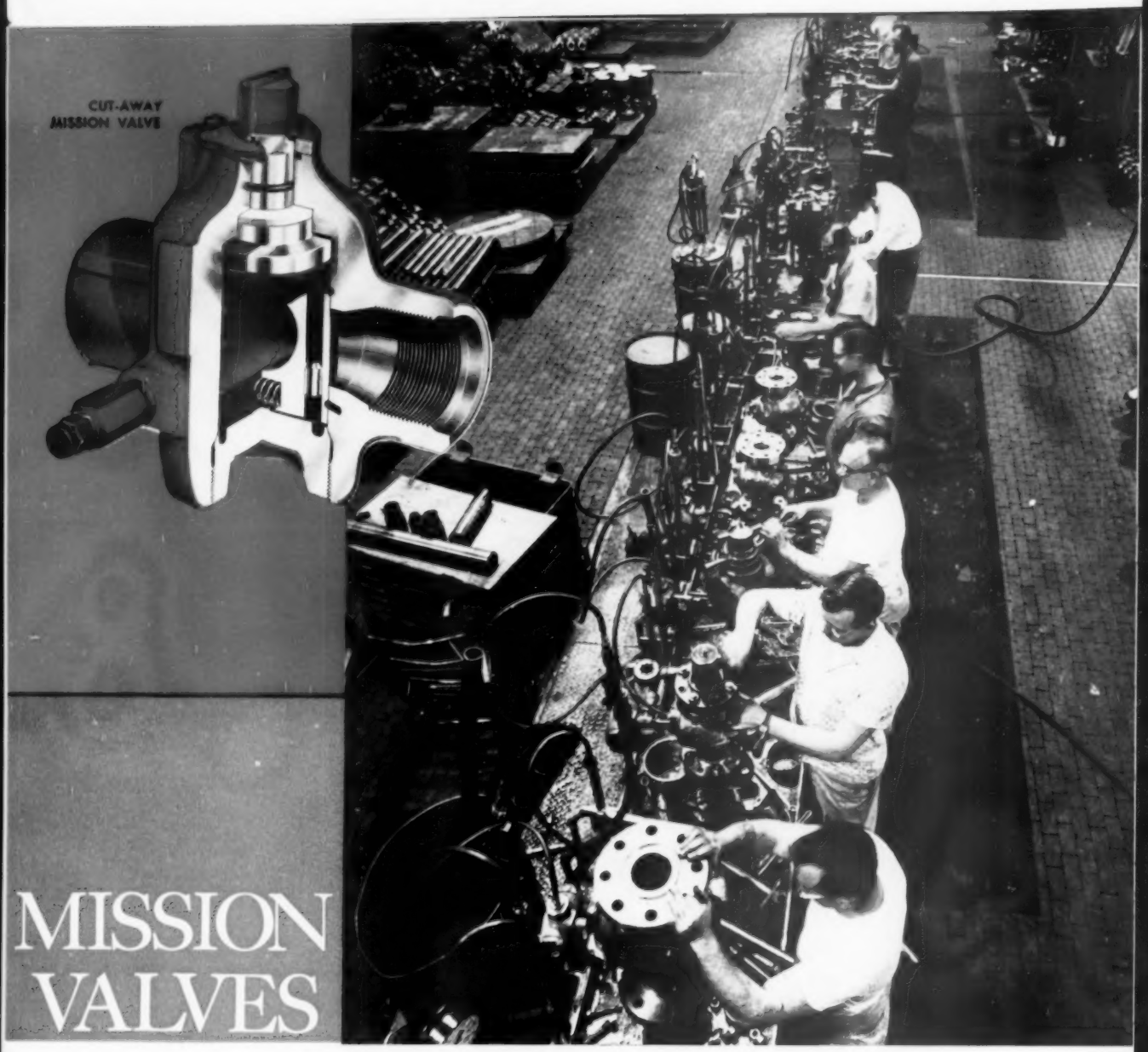

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DEPT/Exploration, Drilling, Production

Gas Strikes Open Big Canadian Area

Completion of two big gas discoveries has set up a vast, new exploratory target in the Ft. Nelson area of northeastern British Columbia.

This remote, muskeg-burdened region includes the two-well Clark Lake field, 7 mi. southeast of Ft. Nelson, and recently completed wildcats at Kotcho Lake, about 45 mi. northeast of Ft. Nelson, and at Petitot River, about 70 mi. north of Ft. Nelson.

The two discoveries and the wells in Clark Lake field all produce from the same formation—the Slave Point of the middle Devonian—at about 6,500 ft.

There are no wells within the giant triangle formed by these wells. And hardly a handful of other tests have been drilled in the larger area extending roughly 120 mi. eastward from Ft. Nelson to Alberta, and about the same distance north to the Northwest Territories.

Weeks of talk concerning the possible magnitude of the Kotcho Lake and Petitot River wildcats preceded formal announcement of their completion.

The Kotcho Lake and Petitot River discoveries appear so promising—on the basis of completion reports—that talk has already been heard of extending pipelines to the area.

Formal announcement of the completions was made a few weeks ago by W. K. Kiernan, Mines Minister for the province, and by Gulf States Oil Co. of Canada and Fargo Oils, Ltd.

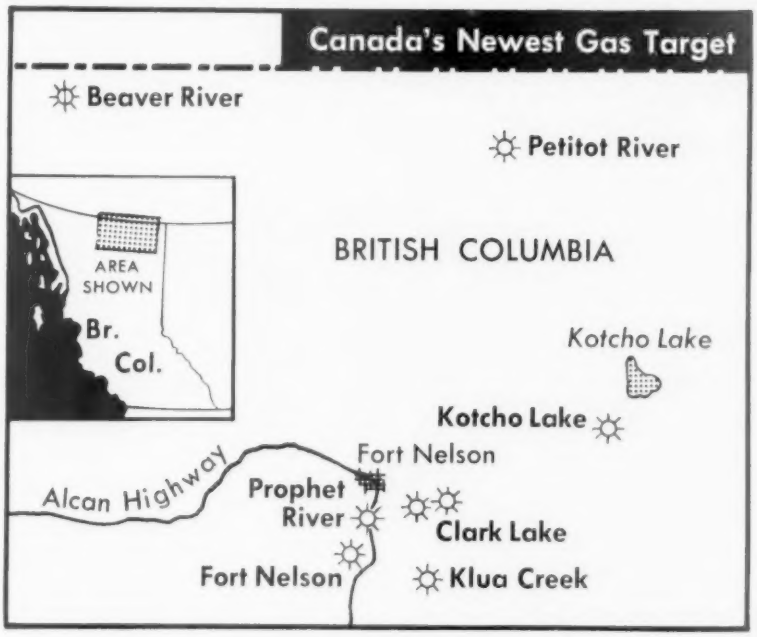
Gulf States is operator for both wildcats; it holds a 25% interest in each. Other quarter-interests in the Kotcho Lake well are held by El Paso Natural Gas Co., General American Oil Co., and the British Columbia Oil Lands, Ltd.

El Paso also holds a 25% interest in the Petitot River well, with Fargo holding the remaining 50%.

The Petitot River well was completed for 6,408,000 cf/d of gas through 3/8-in. choke. The Kotcho Lake well was completed for 5,350,000 cf/d of gas through a 20/64-in. choke.

Fargo officials believe the calculated open flow potential of the Petitot River well "should exceed 150-million cf/d."

As for the Kotcho Lake well, Fargo has said that the absolute open flow of the well can be classified as "one of the larger wells in North America, and could exceed that of the recently discovered British American-Shell Berland River well."



The Berland River discovery is believed to be among the largest in the world (PW—Sep.19'58,p32).

Reports of the completions prompted D. P. McDonald, vice-president of Westcoast Transmission Co., Ltd., to say that the company "is in a position to connect these discoveries with its system as soon as developments warrant."

A statement from Fargo underscores the possibility of imminent pipeline construction: "The Kotcho Lake and Petitot River discoveries are undoubtedly of major importance and should do much to facilitate and expedite the construction of pipelines into this portion of British Columbia in the near future."

PETROLEUM WEEK has learned that Westcoast already is studying routes and making preliminary studies. And since the project is entirely within British Columbia, the extension is certain to have no trouble getting swift approval.

It's estimated that 2-trillion cu. ft. of gas reserves are required to justify major pipeline construction into the area.

John H. Van de Venter, Gulf States' division manager, says "chances look good" for quick proving up of 2-trillion cu. ft. of gas, even in the face of the difficulties posed by the region.

Though understandably reluctant to make an outright forecast, Van de Venter adds that it would not be surprising if a pipeline could be started on the basis of next winter's work, when "a terrific amount of activity" will be under way in the area.

Van de Venter also will not estimate how high reserves might go as drilling progresses. "But there'll be lots more than 2-trillion cu. ft. found," he predicts.

A 200-mi. pipeline extension to the area would cost anywhere from $50-million to $70-million.

The extension could be laid from the Ft. St. John vicinity, where Westcoast and associates have a gas-scrubbing plant.

Westcoast's existing 650-mi. gas pipeline starts at Taylor and connects the Peace River fields with Vancouver, and links up with the El Paso-Pacific Northwest system at the international boundary, at Sumas.

Reports from Vancouver are that the extension likely would be 26-in. in diameter.

Other gas discoveries near Ft. Nelson also add to the potential of the region.

In addition to Clark Lake field, which was discovered in March, 1958, gas wells have been completed at Klua Creek, Prophet River, and Ft. Nelson.

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in a wildcat now being drilled by Pan American Petroleum Corp. in the Beaver River area, about 110 mi. northwest of Ft. Nelson. This hole blew out last January at about 8,500 ft. Drilling is continuing.

Another recent gas strike that points up the general northeast British Columbia gas potential is Pacific Petroleums Ltd. et al No. B-31-1 Bubbles, 80 mi. northwest of Ft. St. John.

Although the entire northeast section of British Columbia is usually considered operational only during the winter, summer drilling will be tried at Clark Lake field this year.

About 85% of the northeast corner of British Columbia is covered with muskeg, running more than 50 ft. deep in some spots. Winter temperatures run 40F and 50F below zero. And that is the rule, not the exception.

Gulf States, however, has already moved a rig to a site in the Clark Lake area, where the company has built more than 10 mi. of road. This summer's test, which will be located close to the road, will be drilled on permit 195, containing 252,672 acres, in which Gulf owns a one-quarter interest. Imperial has a 50% interest, and El Paso the other quarter.

Whether more than one test will be drilled in Clark Lake field depends on what happens on this one.

"We might be limited by muskeg, after all," says Van de Venter. "In that case, we'll wait until winter."

Having had one costly experience with "falling through the muskeg," Gulf States approaches the new effort with considerable caution.

Not only is it tough to operate in the Ft. Nelson area; it also is difficult to make seismic evaluations. But drilling costs are relatively low.

The seismic problems are due chiefly to the fact that the layers are not uniform in thickness.

Van de Venter says surface control is the biggest need. "There just haven't been enough holes," he adds.

It seems to be generally agreed that the important formation is the Middle Devonian, at depths of about 6,400-500 ft. In the Liard Basin region to the northwest, however, this formation might be found at 12,000 ft., as a rough estimate.

Drilling costs range from about $250,000 to $400,000 per hole in the Ft. Nelson region, depending on how much trouble is encountered. In other remote regions of Western Canada, costs can run as high as $1-million.

Gulf States will spend several months analyzing and reviewing seismic work in the region. After evaluations have been made, results will be correlated with drilling results.

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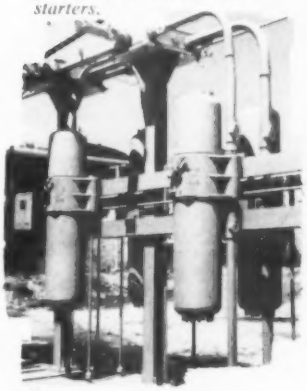

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Canadian Drilling Booms in Lake Erie

A wave of Canadian exploration activity is expected to push expenditures for the bustling Lake Erie gas play to a record high this year.

Nearly 100 holes on approximately 2.3-million acres of offshore permits on the north shore of the lake are planned for this season.

Some 15 to 20 operators are now in the process of moving rigs onto location, or have just started drilling.

Spurred by the profitable southern Ontario industrial market on their doorstep, the operators plan to spend $3-million in the seven-month drilling season.

Last year, Canadian operators spent $2-million on lake work (PW—June 27'58,p22).

Expiring permits and a high market price for the gas provide the stimulus for the drive.

This is the final year for many of the three-year permits. So holders in many instances are rushing to complete the $2,500 expenditure that is required for each square mile by Ontario government permit regulations.

Operators are receiving 45¢ per Mcf. for all the gas they can produce in an expanding market. This compares with prices of 6¢ to 14¢ per Mcf. in Western Canada.

Too, there are no regulations governing production of wells in Ontario.

The great majority of drilling in Ontario has been concentrated in the south west corner of the province, on and adjacent to Lake Erie.

Production-wise, gas wells in the lake and on its shore are relatively small. But so are the costs.

Top wells in Ontario flow up to 1-million cf/d, compared with gas wells in western Canada capable of producing many times that much.

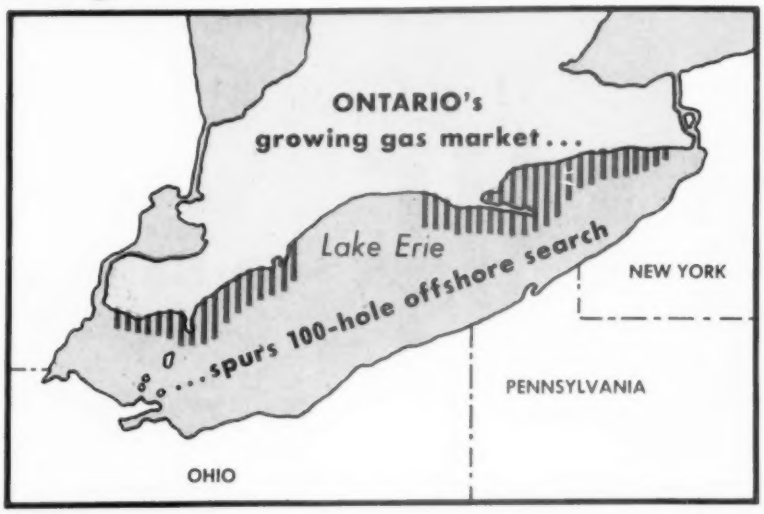
But the shallow Ontario wells—from 900 ft. to 1,500 ft. deep—are much less expensive to drill, running from $20,000 to $45,000 each.

A shortage of lake drilling platforms will prevent the summer play from being even bigger than it will be.

The shortage has forced some operators to build their own platforms, each costing more than $350,000.

The lack of offshore platforms has provided the biggest damper on this summer's program. Some operators say they must curtail earlier and more ambitious projects.

So far, the most ambitious program announced for the lake this summer is that of Place Gas & Oil Co., which has allocated about $1-million to drill 50 holes.



The program will, however, require ideal conditions throughout the summer and fall if all the holes are to be completed before the snow flies. Rough water and storms often hamper lake drilling.

Place's program is a follow-up to five successful completions already made on 131,000 acres of offshore permits.

A recent oil find could swing the company's drilling to the west end of the lake. The Place acreage ties onto Colchester township, south of Windsor, where Imperial Oil early in April made a Trenton oil discovery about 2,400 ft. from the shoreline. Imperial now is moving in a rotary rig to drill a follow-up test 1,000 ft. north of the discovery.

Largest producer in the area is Consolidated West Petroleum, which has about 60 gas wells.

Consolidated's gas deliveries to Union Gas Co. are expected to amount to 2.2-billion cu. ft. this year, which will increase in the future to 3.8-billion cu. ft.

The company's current program calls for spending $500,000 on a 12-to-15-hole program, largely on a 52,000-acre spread of offshore leases at the west end of the lake.

Long Point Oil & Gas plans a 20-hole program at an estimated cost of $500,000 at the east end of the lake. Other operators will be active there, too.

Long Point is opening its work this season by connecting two wells that were completed last summer to Union Gas gathering lines.

Some of its new holes will be development tries as follow-ups to its 1958 successes, but the majority will be probing of some new portions of the company's 160,000-acre offshore spread.

Also at the east end of the lake, Bluewater Gas & Oil is aiming for the first offshore completion of this year.

Its joint test with Harvest Petroleum was suspended last fall with only about 100 ft. to go. Drillers are now back at work.

Harvest also is working with Matachewan Consolidated, Phillips Petroleum, and British American on 127,000 acres of offshore land. The group, which also plans to drill onshore tests, is working in very shallow water at the east end of the lake, where permanent wooden platforms can be easily erected.

Several other substantial exploration and drilling programs are planned, or already under way.

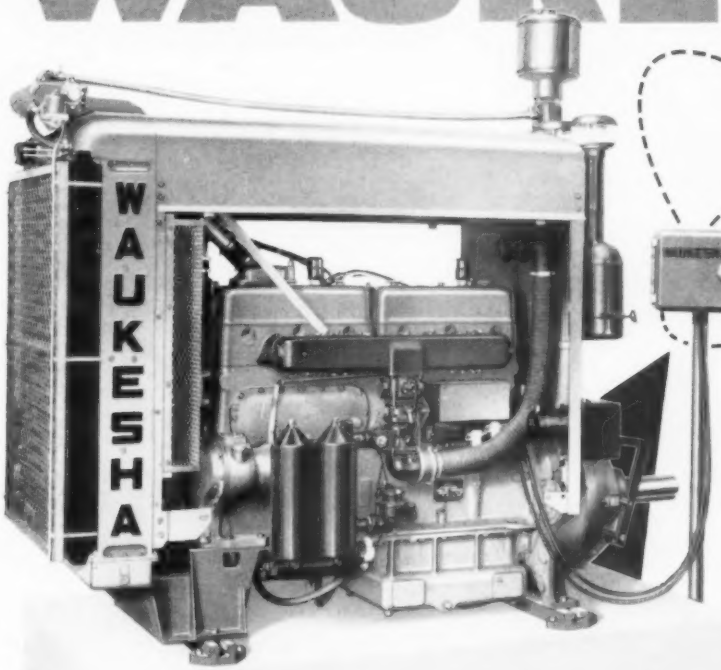
Midcon Oil & Gas plans to spend $200,000 this summer in a drilling and geophysical program on 28,560 acres. Work has just started on a five-hole program.

Submarine Gas & Oil, with five producers on its 10,880 acres, plans a four-hole program.

Other companies that are entering the play include Anchor Petroleum, French Petroleum of Canada on a farmout from Asamera Oil, Augustus Exploration, Baska Uranium Mines, Nu-World Uranium Mines, Peace River Petroleum, Uranium Ridge Mines, and United New Fortune Mines.

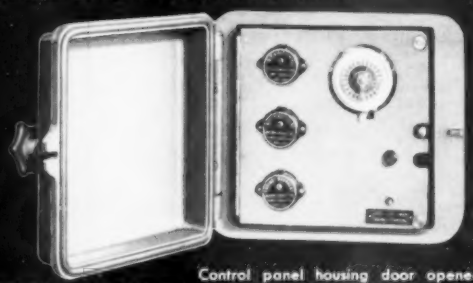
In addition, some small companies have announced stepped-up geophysical activity for this summer.

WAUKESHA

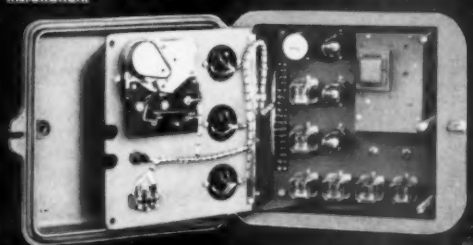


Engomatic POWER CONTROL SYSTEM

Typical Waukesha *Engomatic* Control System installation on a Waukesha Long-Life Oil Field Unit. Note control panel can be mounted in any convenient position.



Control panel housing door opened, showing heavy cast construction, dust and moisture proof seal, starting reset, and time-cycle controls for an *Engomatic* pumping control installation.



Panel open, showing wiring harness, sealed relays and other electrical components, all of highest quality, and designed for long life and easy replacement.

423

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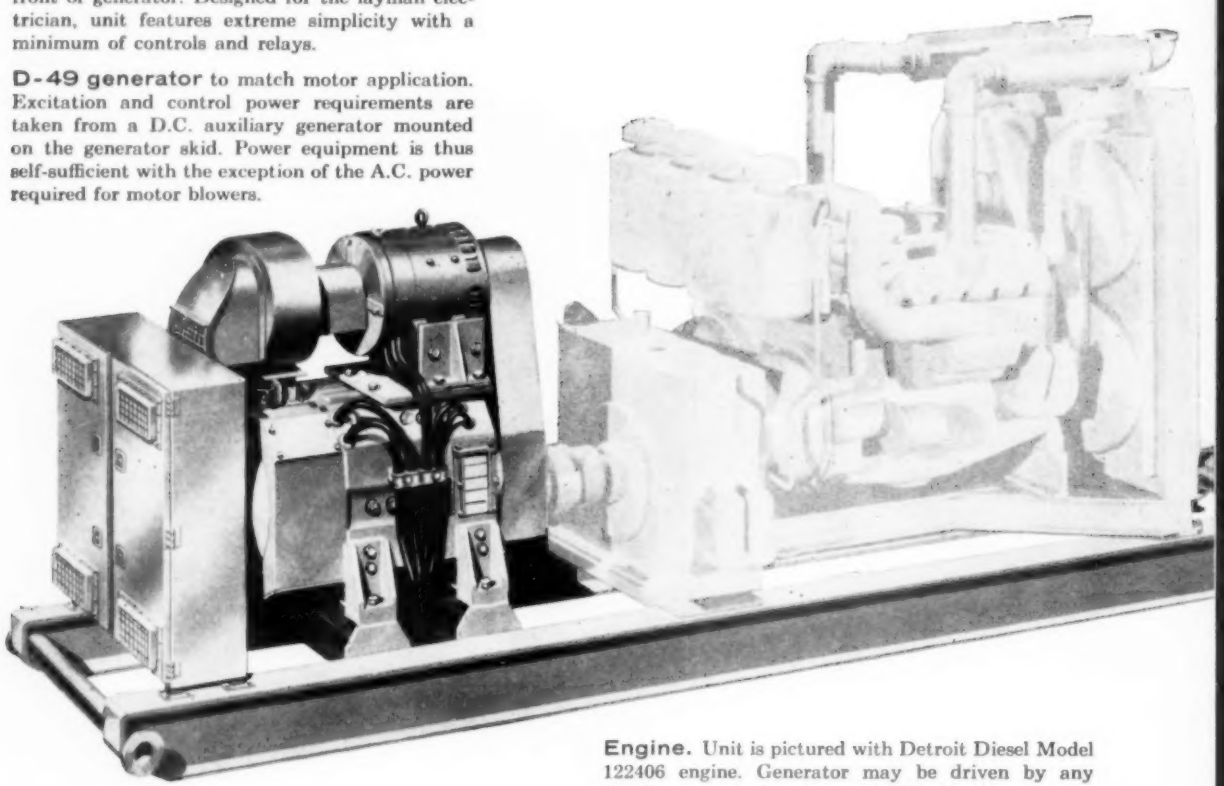
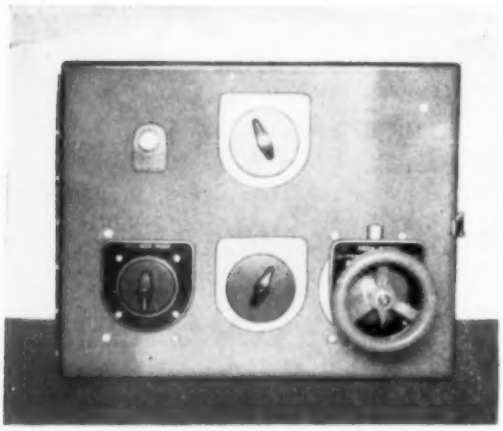


Engine. Unit is pictured with Detroit Diesel Model 122406 engine. Generator may be driven by any diesel or gas engine of comparable horsepower with a shaft speed of 1200 RPM.



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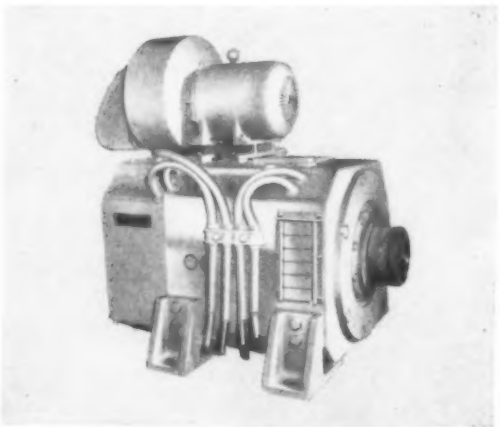

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Unit is set up or taken down with simple electrical connections. No special instructions or electrical knowledge required. Controls are easy-to-learn, accurate and provide complete power flexibility. Generator and drive motors are standardized, permitting parts interchange. Maintenance is extremely low.

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Skid-mounted components are easily portable, save on moving time and costs. Flexible electrical cables speed set-up and take-down time—permit components to be arranged to suit location. No time-consuming alignment required.

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Adaptable

A number of arrangements are available to suit the needs of varying applications. Basic set is a two generator, two drive-motor unit. With addition of another generator skid and two drive motors, unit can drill in excess of 12,000 feet, or, as limited by engine horsepower. Controls are also designed for this expansion.

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Kentucky's Shallow Play Is Spreading

The cable-tool drilling boom that started in central Kentucky's Green County is spreading rapidly into more than a half-dozen neighboring counties.

"It seems the whole rim of the basin is going to produce," says George C. Sakellaris, of Associated Drilling Corp., reflecting what appears to be the happy consensus of operators in the area.

Results of new drilling point to a considerable spread of production in what is already one of the country's hottest oil plays (PW—Feb.27'59, p14;Nov.21'58,p25).

Available land is going at a premium as operators from throughout the country continue to move into the blue grass and bourbon belt. The lure: shallow pays, low drilling costs, and high success ratios.

Most production in Green County is found at around 600 ft., in the Blue sand.

The lease play has expanded along the entire trend, extending from several miles south of the state line, in Tennessee, northward virtually to Louisville.

Major companies, left at the post in the first months of the boom, have now secured extensive acreage for exploration.

Independents from other states also are pouring in. One group of six East Texas oil men joined the play in Taylor County late last year, operating as C-Ville Oil Co. The company's record to date: nine producers in nine tries; with production of 740 b/d.

The success ratio in the area has been running something like 9 out of 10, with considerably higher ratios in some sections.

Just last week, Barnhart-Morrow Consolidated, of Beverly Hills, Calif., announced acquisition of 923 acres in Hardin County. George Talis, president, says drilling will begin immediately on a 463-acre parcel, with Gulf Oil Corp. and W. C. McBride Oil Co. participating.

Completion of discoveries for good production from even shallower pay in Metcalfe County has been tempered by subsequent dry holes.

Three wells were completed in the past few weeks in the Warsaw formation at around 250 ft. The wells, 15 mi. from the southern end of Green County field, are producing an estimated 800 b/d of high-gravity crude.

Significantly, these wells produce no water, unlike the very heavy water flows encountered in the Green County Blue sand play. (Water disposal still remains the major problem operators face in this area.)

Limiting this play, however, is the fact that five dry holes have been drilled to the north and east.

Similar new shallow pays are reported in Grayson and Allen Counties.

One well was completed in the Warsaw near Litchfield, about 55 mi. north of Green County field. The operator reportedly drilled through 1 ft. of pay and the well flowed over 100 bbl. of oil "in a matter of hours," according to one source.

In Allen County, about 50 rigs are reported in action, with the pay zone as shallow as 50-175 ft.

The play is increasing in other neighboring counties, too.

In Hardin County, James Wade, of Shreveport, La., brought in a well at about 800 ft., which is producing black oil with a lower gravity than that of the principal trend.

In Edmonson County, near historic Mammoth Cave, one well drilled in 1937 has been reworked and a new well drilled on extensive acreage held by Reynolds Metals Co., with minor production reported so far from a depth of 1,500 ft.

On the trend down from Greensburg, in the corner of Hart, Metcalfe, and Green Counties, a play has resulted in initial production from a depth of about 600 ft., with several wells producing from 10 to 15 b/d from the Blue sand.

Activity also is on the upswing in Larue, Cumberland, and Barren Counties, and as far northwest as Breckinridge and Meade Counties.

Ashland Oil & Refining Co. has just announced plans to extend its recently-completed 72-mi. pipeline in the area.

The 20,000 b/d pipeline, completed Mar. 30, runs from Green County to Louisville. The existing line and pumping stations will be supplemented by 37 mi. of 6-in. line paralleling the southern end of the present installation, increasing capacity to more than 40,000 b/d.

Ashland also continues to be the major buyer in the area, taking from 90% to 95% of the crude.

The company's Louisville refinery, operated since 1955 primarily as a terminal, went on stream again in early May to process part of the Green County crude. The balance of the oil bought by the company is moved up the Ohio River by barge to the company's refinery, at Catlettsburg.

New Pumping Unit Has No Jack

A new type of mechanical well pumper, which uses a chain-and-gear combination instead of a jack, will soon be going into oilfield operation.

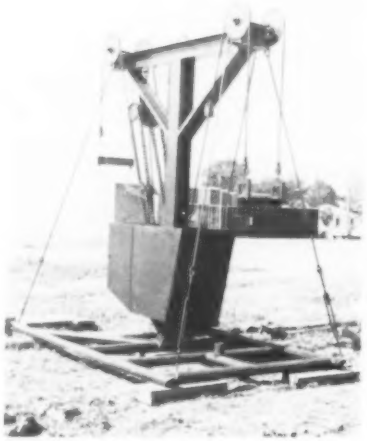
The pump was developed by W. J. Thompson, manager of Bashara Oil Co. and partner in C. L. Young Co., and Wallace Ryle, president of Ryle Mfg. Co. The Ryson Pumping Unit, as it has been named, is being manufactured by Ryson Mfg. Co., Wichita Falls, Tex., and will be distributed by Republic Supply Co.

Basically, here's how the unit works:

An endless chain, powered by virtually any type of motor through a worm-gear arrangement, is linked to other chains that connect the top of the sucker rod string to counterbalancing weights. The chains travel over a system of sprockets.

As the endless chain is turned, it carries the chains connecting the rod string and the weights through a pumping cycle.

One of the unit's most striking features is its exceptional stroke length.



BALANCED WEIGHTS enable this pumper to use very low horsepower motors.

The two models now being offered by Ryson both have a 72-in. stroke.

In wells producing large volumes of

DU PONT *Petroleum Chemicals* NEWS

Number 96 in a Series of Bulletins for the Petroleum Industry

MAY-JUNE 1959

Refiner cuts TEL unloading time in half with help from Du Pont

To solve specific problems, Du Pont offers most fully rounded line of additives

Each of the additives in Du Pont's complete line was developed to overcome a precise problem or add a performance "extra" to your petroleum product. For example . . .

1. Tetraethyl Lead—For highest octanes at lowest cost. To give you fast, dependable delivery, Du Pont maintains ample stocks at 25 distribution points throughout the U.S., convenient to refiners everywhere.

2. Fuel Oil Additive No. 2 — Improve your fuel oils with Du Pont FOA-2, the additive which stabilizes heating oils, diesel fuels and residual stocks.

3. Du Pont Dyes—A complete line of oil colors for identifying grades, meeting legal requirements and for adding brand identification to your gasoline, fuel oil, lubricants and other petroleum products.

4. Du Pont Metal Deactivator—Combats copper-caused gum in gasolines, and sludge and gel formation in fuel oils.

5. Du Pont Metal Suppressor—A newly developed product uniquely effective for coating copper parts in hydrocarbon systems and thus suppressing solution of the metal into the product.

6. Antioxidants—Protect gasolines from oxidation and gum formation. Complete line offers antioxidants for every purpose, every refinery stock.

7. "Ortholeum"® 300 — Stabilizes and protects greases. It offers the combined advantages of metal deactivation and antioxidant action.

8. Additives for industrial oils and lubricants—Three widely used and highly effective additives for improving the performance and stability of industrial oils and lubricants are:

"Ortholeum" 162 lubricant assistant
PAN (phenyl-alpha-naphthylamine)
PBN (phenyl-beta-naphthylamine)

CONTINUED OTHER SIDE

IMPROVEMENTS over an old tetraethyl lead unloading line, suggested by Du Pont engineers, made it possible to lift TEL more than 16 feet from tank car to storage level. The new line has cut unloading time in half. An additional advantage is that the new line handles both motor mix and aviation mix, thereby saving some $50,000 in unneeded new equipment. Furthermore, because of the improved time factor, one shift instead of two handles all unloading.

Changes recommended by Du Pont engineers have boosted the unloading rate at one refinery from 340 lbs/min to 800 lbs/min.

Unloading time required for 6000-gallon tank cars has dropped to less than two hours. With the old setup it took from four to six hours to unload the same cars.

The switch involved was from an old two-inch line with numerous valves and fittings to a simplified three-inch line having only two valves, two ammonia elbows and three ammonia tees.

The new design was based on careful calculations of pressure drop in both the old and proposed systems by the Du Pont representative. He then advised on the construction, tested and helped to start the operation of the new system, working at all times with the refinery engineering department.

Are you taking full advantage of Du Pont engineering know-how?

You'll find Du Pont ready to go a long way in custom-engineering service to help you solve problems involving tetraethyl lead and other petroleum additives.

Customer requests for service in the past have led to such Du Pont developments and innovations as the siphon starter, valves trimmed with "TEFLON,"® Metal-Flex unloading hose, dry dye eduction systems, and a host of other developments now widely applied in the industry.

How can you get Du Pont service?

You start by phoning or writing to the Du Pont sales office nearest you (see list on back of this page). You'll get prompt and thorough attention.

®"Teflon" is Du Pont's trademark for its TFE fluorocarbon resin.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT *Petroleum Chemicals* NEWS

CONTINUED **Complete Line**

Service also is available for the selection and handling of these additives, and in training your blending plant personnel. Your Du Pont Petroleum Chemicals representative supplies these and many other services. He's backed by a large staff of specialists in research, training, production, safety, sales promotion and advertising, men who have devoted long careers to cooperating with refiners.

Write for more information.

WEST COAST REGIONAL MANAGER

ROBERT F. HARWICK is manager of the Du Pont Petroleum Chemicals Western Region.

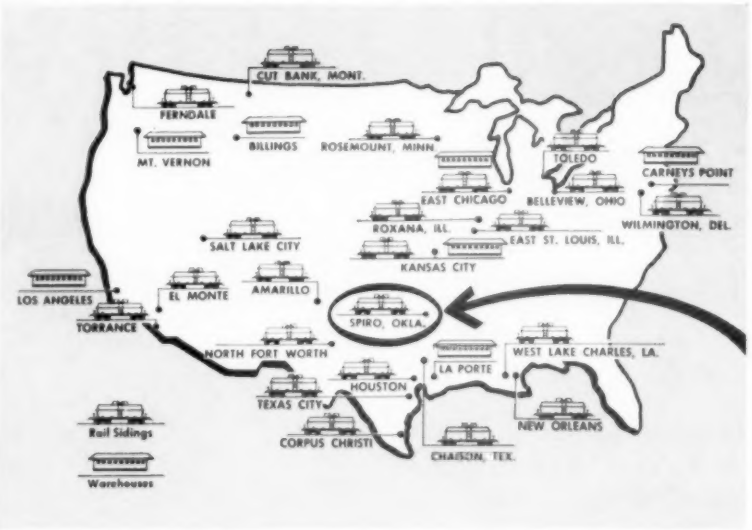
He's in charge of a variety of activities west of the Rockies. These include a Regional Sales office in Los Angeles, District Sales offices in Seattle and San Francisco, a regional laboratory and a tetraethyl lead terminal at El Monte, California, as well as additives warehouses and railway distribution centers at Ferndale, Washington; Port Costa, Antioch, Torrance, and El Monte, California; and Salt Lake City, Utah.

The new Du Pont TEL plant at Antioch makes available the TEL sold by Mr. Harwick's group.

Prior to this assignment, Mr. Harwick was the assistant manager of the Du Pont Elastomers Department's Akron office.

He brings to his job a broad range of oil industry experience, covering phases all the way from manufacturing to editorial work with a petroleum publication.

A graduate of Drexel Institute with a B.S. degree in Chemical Engineering, Mr. Harwick served for four years with the U. S. Army during World War II.



New TEL Sidetrack in Oklahoma

Now there are 22 points from which you can get emergency shipments of Du Pont TEL.

To provide even faster service to customers in Oklahoma and Southern Kansas, we are now keeping TEL on hand at a new siding at Spiro, Oklahoma.

Ample supplies of both motor mix and aviation mix are always ready to roll from all 22 sidetracks shown above. There's someone at the phone night and day at each point, ready to expedite your emergency orders.

There are also truck terminals at Carneys Point, New Jersey; Antioch and El Monte, California; Beaumont, Texas; and Ferndale, Washington, complete with weigh tanks and storage facilities, so that you can order rush shipments of TEL in less-than-tank-car quantities.

For further information on service from any of these points, contact the Du Pont Sales office listed at the right which is nearest you.

How far are you from a Du Pont additives warehouse?

Each of the seven warehouses shown on the map above is ready to make rush deliveries on any Du Pont petroleum additive whenever the need arises.

All seven maintain ample stocks of all our additives, including Du Pont Metal Deactivator, antioxidants, dyes, fuel oil additives, and grease stabilizers.

Contact any of the sales offices listed below for fastest service.

SALES OFFICES

Chicago 3—8 So. Michigan Ave. . . . . RAndolph 6-8630
Cleveland 15—101 Prospect Ave. . . . . MAin 1-3422
Houston 2—705 Bank of Commerce Bldg. . . . . CApitol 5-1151
Los Angeles 17—612 So. Flower St. MAdison 4-1354
New York 20—45 Rockefeller Plaza COlumbus 5-2342
Philadelphia 2—3 Penn Center Plaza LOcust 8-3531
Pittsburgh 22—1 Gateway Center ATlantic 1-2933
San Francisco 4—111 Sutter St. . . . EXbrook 2-1934
Seattle 3—4003 Aurora Ave. . . . . MElrose 2-6977
Tulsa 1—1811 So. Baltimore Ave. . . . . LUther 5-5578
In Canada—Du Pont of Canada Limited, Petroleum Chemicals, 85 Eglinton Ave. East, **Toronto 12**—Ontario . . . . . HUdson 1-6461
OTHER COUNTRIES: Petroleum Chemicals Division, Export Sales, Wilmington 98, Delaware, PRospect 4-2962.

DU PONT
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Better Things for Better Living
. . . through Chemistry

Du Pont Tetraethyl Lead and other Petroleum Additives

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-10740

Printed in U.S.A.

water with the oil, the longer the stroke, the better the rate of oil production, says Thompson.

The smaller unit is designed to handle a 4,000-lb. polished rod load. The other unit is designed to handle a 6,500-lb. load.

Planned units include one to handle a 9,000-lb. load, and one with a 120-in. stroke.

In addition to lifting more liquid per stroke, the unit permits a lower rate of operation, which leads to reduced wear on rods and other parts.

The speed can be varied from ½ stroke to 6 strokes per minute.

Says Thompson: "A Ryson 6-ft.-stroke unit, running 4 strokes per minute equals the same 24 linear feet as a conventional unit running 12 spm. But with the conventional unit, the bottom hole balls and seats have opened and closed 12 times per minute, while the Ryson balls and seats have opened and closed only 4 times per minute.

"More fluid is pumped with the same linear feet because the balls and seats remain closed except for the number of strokes per minute.

"Rod stress is reduced through slow intervals, and rod whip and tubing score are reduced to a minimum. The bottom hole equipment's life is increased three times over that of a conventional unit."

The new pump will result in less need for well servicing, the designers say.

Turbulence is reduced around the bottom of the pump, Thompson says, and "sand is given a chance to settle out before entering the pump chamber."

This, plus increased life for downhole equipment, he adds, means that the need for well servicing "will be reduced considerably."

The key to the unit's performance is the use of counterbalancing weights.

The weights simply overcome the "rod balance"—the amount of pull necessary to lift the fluid to the surface.

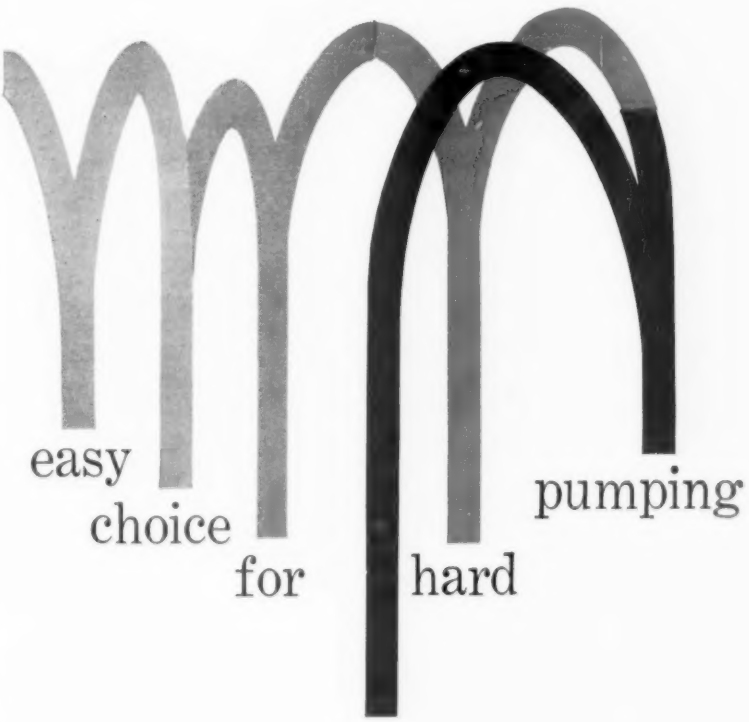
Ryson figures that if this weight can be balanced to within 500 lb., the unit will work satisfactorily.

A balance of 100%, which would be ideal, usually is difficult to accomplish because the hydrostatic head of a well ordinarily varies considerably.

Horsepower requirements to operate the unit are very low.

With proper counterbalancing, says Thompson, "the prime mover size can be reduced by 50% of that of a conventional unit with comparable polished rods."

Hard pumping, or corrosive or abrasive fluids, often result in frequent, expensive pulling jobs due to valve failures. If you are having this problem, the solution lies in genuine DuMore Balls and Seats. DuMore, a special composition of chromium, cobalt, and tungsten, will take any kind of punishment because of its exceptional resistance to impact and pressure. Every DuMore Ball and Seat is manufactured to exact A.P.I. specifications. Each ball is precision ground to a sphericity of .0001". Each seat is individually ground and mated to its ball, vacuum tested, and individually packaged to assure perfectly-matched sets. Ask your supply store about DuMore. They'll tell you it's the best ball and seat you can run.



DuMore BALLS AND SEATS

"Best Balls and Seats in the Oil Patch"

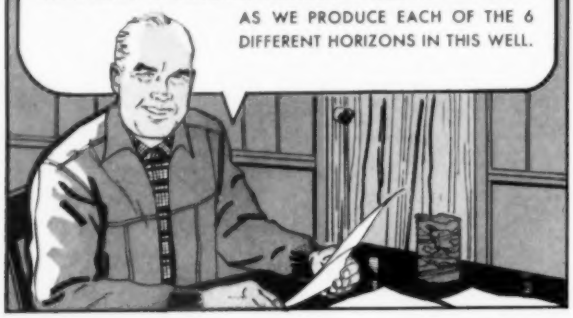
MADE BY HARBISON-FISCHER • FORT WORTH

Printed in U.S.A.

1

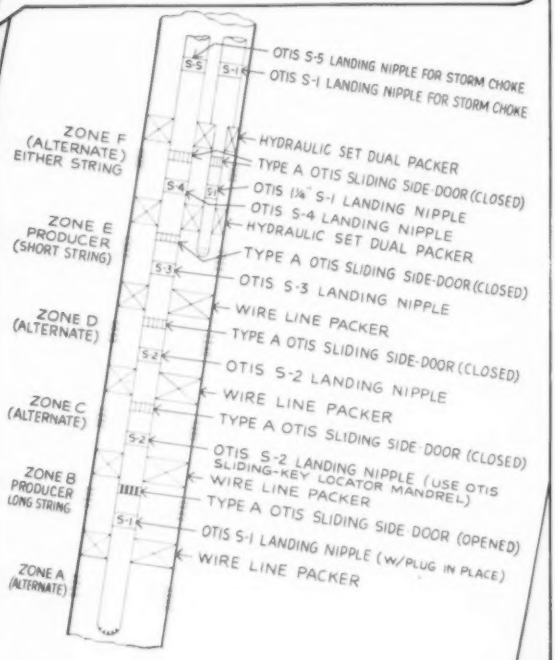
OTIS SLIDING SIDE-DOOR EQUIPMENT
WILL SAVE US SEVERAL HUNDRED DOLLARS PER ZONE

AS WE PRODUCE EACH OF THE 6 DIFFERENT HORIZONS IN THIS WELL.



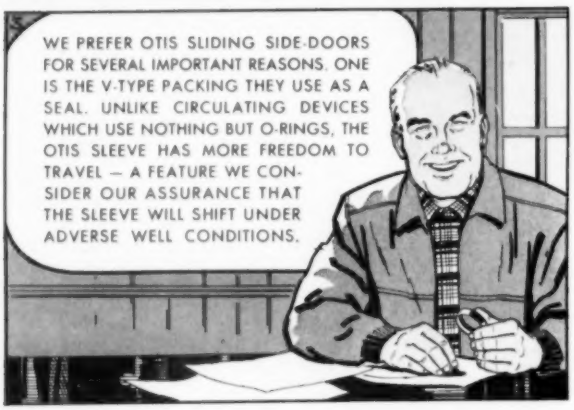
2

ADD TO THAT THE THOUSANDS OF DOLLARS WE SAVED BY DRILLING ONLY ONE WELL TO PRODUCE THESE 6 FORMATIONS AND YOU'LL SEE WHY WE'RE SOLD ON MULTIPLE-ZONE WELLS AND OTIS SLIDING SIDE-DOOR EQUIPMENT. HERE'S A DIAGRAM OF THE WELL.



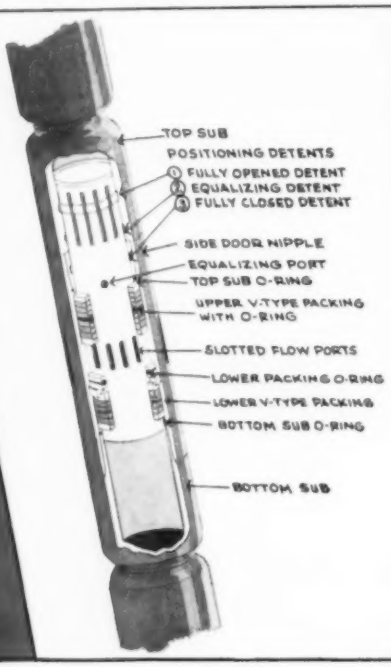
3

WE PREFER OTIS SLIDING SIDE-DOORS FOR SEVERAL IMPORTANT REASONS. ONE IS THE V-TYPE PACKING THEY USE AS A SEAL. UNLIKE CIRCULATING DEVICES WHICH USE NOTHING BUT O-RINGS, THE OTIS SLEEVE HAS MORE FREEDOM TO TRAVEL — A FEATURE WE CONSIDER OUR ASSURANCE THAT THE SLEEVE WILL SHIFT UNDER ADVERSE WELL CONDITIONS.



4

THEN THERE'S OTIS' VERTICAL SLOTTED PORT DESIGN. THIS GIVES OTIS SLIDING SIDE-DOORS MAXIMUM STRENGTH—AND ACTS TO PREVENT DISTORTION OF THE TOOLS AS THEY ARE SUBJECTED TO THE STRESS AND TORQUE OF A PRODUCTION STRING. HERE'S A DETAILED DRAWING OF THE TYPE A OTIS SLIDING SIDE-DOOR. NOTICE THE DESIGN ADVANTAGES.



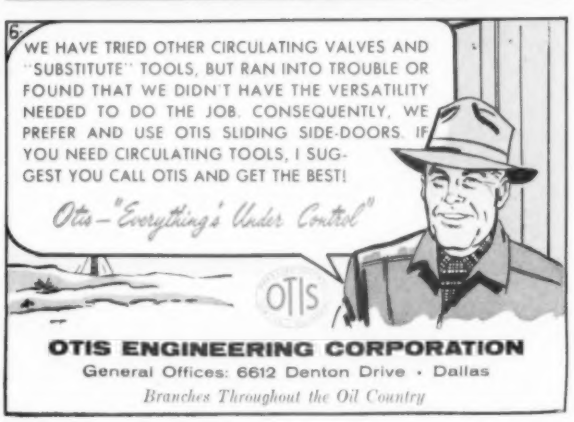
5

ANOTHER ADVANTAGE OF THIS OTIS EQUIPMENT IS THAT WITH THEIR SHIFTING TOOL THEY CAN OPEN AND/OR CLOSE ONE OR SEVERAL SLEEVES WITH JUST ONE TRIP OF THE WIRE LINE. AND YOU'RE SURE THE SLEEVES ARE FULLY SHIFTED, TOO. OTIS' SHIFTING TOOLS WON'T RELEASE UNTIL THE SLEEVES ARE EITHER FULLY OPENED OR FULLY CLOSED. OTIS HAS AN EXPENDABLE SHIFTING TOOL IN ADDITION TO THEIR WIRE LINE TOOL, THAT CAN BE PUMPED DOWN WITH THE MUD PUMP DURING COMPLETION WORK TO CLOSE THE SLEEVES.

6

WE HAVE TRIED OTHER CIRCULATING VALVES AND "SUBSTITUTE" TOOLS, BUT RAN INTO TROUBLE OR FOUND THAT WE DIDN'T HAVE THE VERSATILITY NEEDED TO DO THE JOB. CONSEQUENTLY, WE PREFER AND USE OTIS SLIDING SIDE-DOORS. IF YOU NEED CIRCULATING TOOLS, I SUGGEST YOU CALL OTIS AND GET THE BEST!

Otis—"Everything's Under Control"



OTIS ENGINEERING CORPORATION

General Offices: 6612 Denton Drive • Dallas

Branches Throughout the Oil Country

New Log Finds Oil by Measuring Oxygen

A new and significantly different logging tool—an oxygen activation log that uses an accelerator-type nuclear source—is now going through its final testing stages.

An expedition to provide extensive field testing of a prototype of the new unit is now being conducted by Well Surveys, Inc., the Tulsa-based research and development arm of Lane-Wells Co., one of the Dresser Industries.

The expedition will evaluate the new tool in various types of field conditions.

It will do its initial work in the Mid-Continent area, with operations radiating outward from home base in Tulsa. Other areas on the test agenda are West Texas, the Gulf Coast, and the Rocky Mountain region.

"What we have," says acting technical director Gilbert Swift, "is a new tool that is as different from the conventional neutron log as the acoustic is from the electric.

"One of our primary objectives is to acquaint potential users with it. Once we have evaluated the results of the demonstrations and tests, we'll be in a better position to plot our next step."

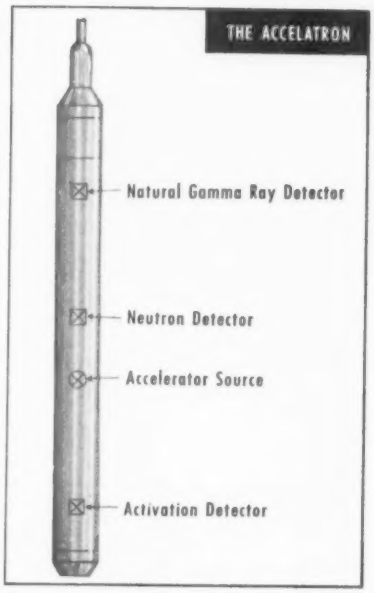
The Accelatron, as the new tool is called, consists of two instruments in one: (1) a particle accelerator for neutron bombardment; and (2) a complementary detector for logging oxygen in the surrounding rocks.

The particle accelerator itself is essentially a scaled-down version of the well-known Van de Graaff atomic accelerator. Several of the latter, built by High Voltage Engineering Corp., are in use in various oil company research laboratories.

The feasibility of a downhole accelerator suitable for well logging has been recognized since the reaction of deuterium with tritium, producing neutrons with kinetic energy of 14 Mev (million electron volts), was found by nuclear researchers to be a vastly more prolific source of neutrons than previously known reactions.

Research by Well Surveys and others now has solved the problem of producing a miniature atom smasher capable of withstanding the rigorous conditions associated with normal well logging. Research and development work at Well Surveys has been under the direction of Arthur Youmans.

The oxygen activation log is based on the detection of gamma rays from induced radioactivity produced in the formation by bombardment with fast neutrons.



The log quantitatively measures the amount of artificial radioactivity that is produced by bombardment of the formation oxygen.

Oxygen can be measured by this technique because it reacts to produce an isotope readily distinguishable from other induced activity in the rock.

Such logs haven't been possible in the past because the reaction occurs only when the neutron energy exceeds about 10.6 Mev, and therefore can't be initiated by neutrons from conventional sources.

Preliminary experiments show that the new tool provides an adequately sensitive method for detection and measurement of whatever oil is present in the reservoir.

Porous rock filled with oil has a much smaller oxygen content than other rock, whether dry or water-saturated.

Oxygen exists in most nonporous rocks in proportions varying from 58% to 54% by weight. Water, of course, contains oxygen, but oil and gas don't.

Oxygen content is thus related to oil content, being more or less inversely proportional to the oil saturation of the rock expressed in percentage of volume.

Water-filled porosity has a tendency to respond like dense rock because of the oxygen content of the water.

As with other nuclear logs, an important area of application seen for the Accelatron is its use in locating pay zones behind casing.

Cased wells offer an advantage for the oxygen log because, after the hole has been cased and cemented, gravity and capillary forces tend to encourage the oil displaced by drilling fluid to return to the area near the borehole, where it can be more readily detected.

The Accelatron differs in several ways from conventional nuclear logging devices.

It can be turned off, and therefore is safe to handle when not in operation.

Deuterium-tritium (DT) neutrons from the accelerator have an energy of about 14.3 Mev as compared with an average of about 5 Mev for neutrons from conventional sources.

The DT neutrons have a great range through hydrogenous matter and permit measurements deeper into the formation. And the DT reaction does not produce gamma radiation at the source, thus eliminating one of the basic limitations of neutron-gamma logging with conventional sources.

Oxygen activation logging, however, isn't without some drawbacks.

One thing that can upset the reliability is the invasion of permeable sections by water-base mud used in drilling. Even though partially-flushed zones exist near the borehole, however, it is generally believed enough oil will remain in place to be detected.

In practice, the new log will be run in conjunction with a conventional neutron log and a natural gamma ray log.

The prototype downhole tool used for this purpose measures 23 ft. in length and 3⅝ in. in diameter.

All formations are irradiated continuously by the DT neutron source as the instrument is moved uphole at a speed of about 20 ft. per minute.

Oxygen-activation gamma rays are selectively detected by a scintillation counter suitably located below the radiation source, so that instantaneous gamma rays produced by the neutron scattering can't reach the detector.

The intensity of the measured radioactivity depends on the strength of the neutron source, the logging speed, the source-to-detector spacing, and formation properties.

The adjustment of a discriminator on the counter eliminates "background" count due to natural radioactivity in the strata.

Serious work on the Accelatron began about ten years ago, with intensive research and development efforts being made during the past six or seven years.

What's New / IN EXPLORATION, DRILLING, PRODUCTION

Will Oil Be Priced Out of Energy Market?

The increasing cost of finding oil may make alternative energy sources —such as shale oil—economically attractive, and thereby change the course of the oil industry in the future, says Royce A. Hardy, Assistant Secretary of the Interior.

Predicting that the U. S. will run out of oil "has been a popular pastime for 50 years," Hardy notes, "and for 50 years the oil industry has proved all pessimistic predictions to be wrong."

However, he says, while the U. S. is not about to "run out of oil," within the immediate future, increasing discovery costs are bound to be reflected in product prices.

When this happens, he told the American Society of Mechanical Engineers at the International Petroleum Exposition in Tulsa last week, it will undoubtedly add attractiveness to alternate energy sources.

•

'Operation Plowshare' Winning Support

Substantial oil- and chemical-company support has been indicated for the proposed nuclear blast to free oil from shale, according to Interior Secretary Fred Seaton.

The Bureau of Mines recently sent questionnaires to companies asking whether they favored the project and whether they would be willing to contribute to the financing.

Seaton said 20 major oil and chemical firms responded. None opposed, although two did suggest a small-scale experiment first, to solve one technical problem of handling of shale for retorting.

"Several" of the firms offered to contribute financial aid, Seaton said. He explained his use of the word "several" as meaning more than three but less than ten.

•

Aneth Ruling Due

A decision from Utah's Oil & Gas Conservation Commission as to when secondary recovery will start in Aneth field is expected soon.

The findings of recently-completed three-to-five-day bottom-hole pressure surveys are now being tabulated. The data are expected to dictate the position the commission will take on the secondary recovery issue.

The commission last month told Aneth operators, in effect, that some voluntary agreement on secondary recovery must be reached soon or the commission would settle the issue itself (PW—Apr.10'59,p19).

•

A California attorney and the Alaska Dept. of Natural Resources are preparing preliminary rules and procedures for state land leasing.

The attorney is James L. Wanvig, an oil and gas leasing consultant for the San Francisco firm of Pillsbury, Madison & Sutro, which represents many companies in the oil and gas industry.

Wanvig says it will take about two months to complete the program, after which public hearings will be scheduled.

•

Union Oil Co. of California has initiated a full-scale miscible-phase flood in the Gatchell sand unit, in the Polvadero area of the Guijarral Hills field, Fresno County, Calif.

Approximately 50,000 bbl. of LPG will be injected in the initial phase, to be followed by injection of some 15½-billion cu. ft. of gas over a period of eight or nine years.

Twenty-one wells produce approximately 860 b/d of 30-gravity oil in the Gatchell (Eocene) pool, which was proved productive in February, 1955, at about 10,600-700 ft.

•

A sudden land play has developed in the remote Caribou Mountain region of Alberta, about 350 mi. north of Edmonton.

Two Calgary-based companies have filed on reservations comprising a combined total of 1,809,000 acres. The companies—Home Oil Co., Ltd., and Dynamic Petroleum Products, Ltd.—are the main participants so far. Dynamic has filed on 1.1-million acres and Home on 709,000 acres.

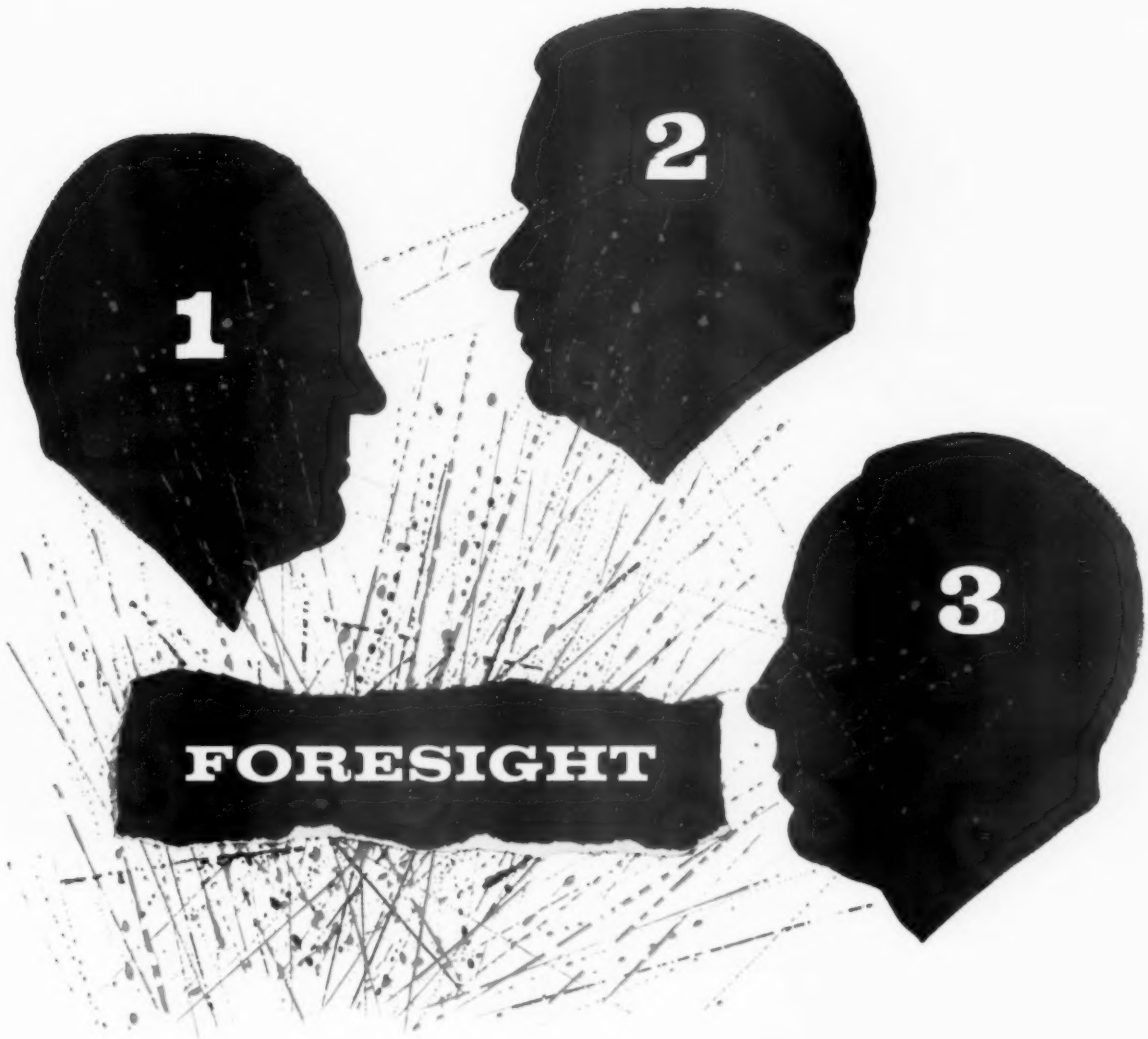
Officials of neither company would reveal the basis for the sudden interest in the area. The companies are not engaged in any joint program.

•

Texaco Inc. has asked several construction companies to submit preliminary plans and bids for an offshore drilling platform—presumably

New Barge Has Closed Circuit Television

Closed-circuit television on the drilling floor of Sun Oil Co.'s Sunco No. 3 permits the driller to keep a close eye on the engine room. The barge, which measures 200 ft. long and 54 ft. wide, and has a hull depth of 14½ ft., was built by Avondale Marine Ways, Inc. The 143-ft. Ideco mast can handle 16,200 ft. of 4½-in. drill pipe or 25,000 ft. of 3½-in. drill pipe.



In every field, look-to-the-future management makes one company a leader

General Geophysical Company is recognized in all oil areas as the pace-setter in geophysical exploration. Each General employee has played a part in putting the company in this envious position. But, the prime responsibility rests on sound, progressive management. General's foresighted management includes:

1 *Chester Sappington:* Chairman of the Board, an oil exploration authority with 27 years 'round-the-world experience; noted for his knowledge of Gulf Coast and South American fields.

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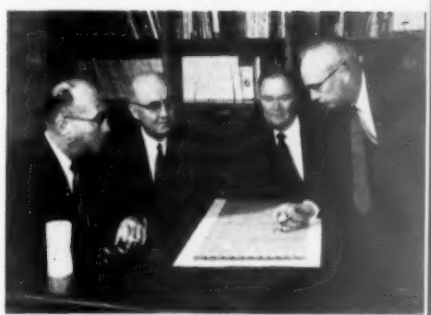

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to be used for drilling on Texaco's Cuarta Canyon lease off Santa Barbara County, Calif.

Texaco, as operator for itself, Monterey Oil Co., and Newmont Mining Co., is drilling its fourth corehole on the offshore lease. Two earlier tests were unofficially reported to have flowed at "high" rates on formation tests.

•

A plan to waterflood three now-abandoned leases in the famed old Ranger field, Eastland County, Tex., was submitted last week to the Texas Railroad Commission.

H. L. Bilhartz and associates asked to flood the McCleskey sand under the three leases, which cover an estimated 492 acres. They told the commission that if their pilot flood works, they plan to flood more of this picturesque field of boom days, which was opened in October, 1917.

The three leases—Ida Slayden, J. G. Christmas A, and J. W. Terry, W. H. Ahrenbeck and Mark Haley survey—produced 1,006,000 bbl. before they were abandoned.

The applicants say they will recover an additional 5,000 to 7,000 bbl. of oil per acre as a result of the waterflood—which adds up to more than twice the original production.

•

Standard Oil Co. of California paid $866,685 last week for leases on 30,954 acres in Duchesne County, Utah.

As high bidder on each of the 14 tracts offered for oil and gas leasing by the Uintah and Ouray Indian Agency, Standard paid an average of $27.99 per acre.

The acreage lies in 1n-1,2,3, and 4w.

•

Mountain Fuel Supply Co. has farmed out 80,000 acres on the Monument Upwarp, on the west side of Utah's Paradox Basin, to General Petroleum Corp.

W. T. Nightingale, MFS president, says General Petroleum will drill up to four wells to validate the leases.

He also says that MFS has taken "a substantial acreage position" in Utah's Uinta Basin, now the scene of a growing gas play.

•

Drilling Highlights

Oklahoma—Sohio Petroleum Co. has released information on a tight-hole discovery 2 mi. west of Sandy Creek pool, Murray County. The No. 1-A Lewis, section 32-1n-2e, found a gas show in the Hunton (Devonian) lime at 4,588-658 ft.; recovered 1,500 ft. of oil on test of the Viola (Ordovician) at 5,047-78 ft.; 350 ft. of oil with a gas flow of 12-million cf/d from the First Bromide at 5,588-620 ft.; 1,500 ft. of oil from the Second Bromide at 5,637-77 ft.; 2,650 ft. of oil from the Third Bromide at 5,935-66 ft.; and 3,500 ft. of oil and 500 ft. of water from the McLish (Ordovician) at 5,972-6,015 ft. Total depth is 6,760 ft., with casing landed at 6,150 ft.

Alaska—Union Oil Co. of California and Ohio Oil Co. will drill a wildcat on section 1-4n-12w, 6 mi. north of Kasilof, Kenai Peninsula. Union, as operator, will use the Coastal Drilling Co. rig released by Halbouty Alaska Oil Co. following abandonment of the latter's initial Kenai test recently.

North Texas—A. R. Dillard No. 1 Hapgood, A. J. Yarbrough survey, Clay County, was dually completed for 162 b/d of 41.2-gravity oil through ¼-in. choke and perforations at 4,868-73 ft. in the Bryson (Pennsylvania), and 480 b/d of 44-gravity oil, plus 12½% water, through 18/64-in. choke and perforations at 6,167-77 ft. in the Mississippian. Location is 1 mi. west of production.

In Archer County, Gulf Oil Corp. No. 1-B. J. R. Parkey, Jr., Dallas County school land survey, was completed for 426 b/d, based on 6-hour flow of 106.5 bbl. of 38.6-gravity oil through 12/64-in. choke and perforations at 4,897-909 ft. in the Caddo (Pennsylvania). The discovery is 2 mi. west of production.

Utah—British-American Oil Producing Co. No. 1 Government—Norwood, section 15-40s-22e, San Juan County, recovered 730 ft. of oil, 120 ft. of gas-cut mud, 150 ft. of mud-cut oil, and 200 ft. of salt water on 3-hour drillstem test of the Paradox (Pennsylvania) at 5,758-827 ft. Gas flowed after 15 minutes at the rate of 100,000 cf/d. Location is 1¾ mi. northeast of Bluff Bench field.

Wyoming—Davis Oil Co. No. 1 Federal-Cellars, section 25-45n-67w, Weston County, flowed at the rate of 25 bbl. of oil per hour on 90-minute drillstem test of the Muddy at 6,664-94 ft. Gas flowed after 5 minutes at the rate of 800,000 cf/d. The wildcat, a scheduled Dakota test, is 2 mi. south of Muddy production in Lonetree Creek field.

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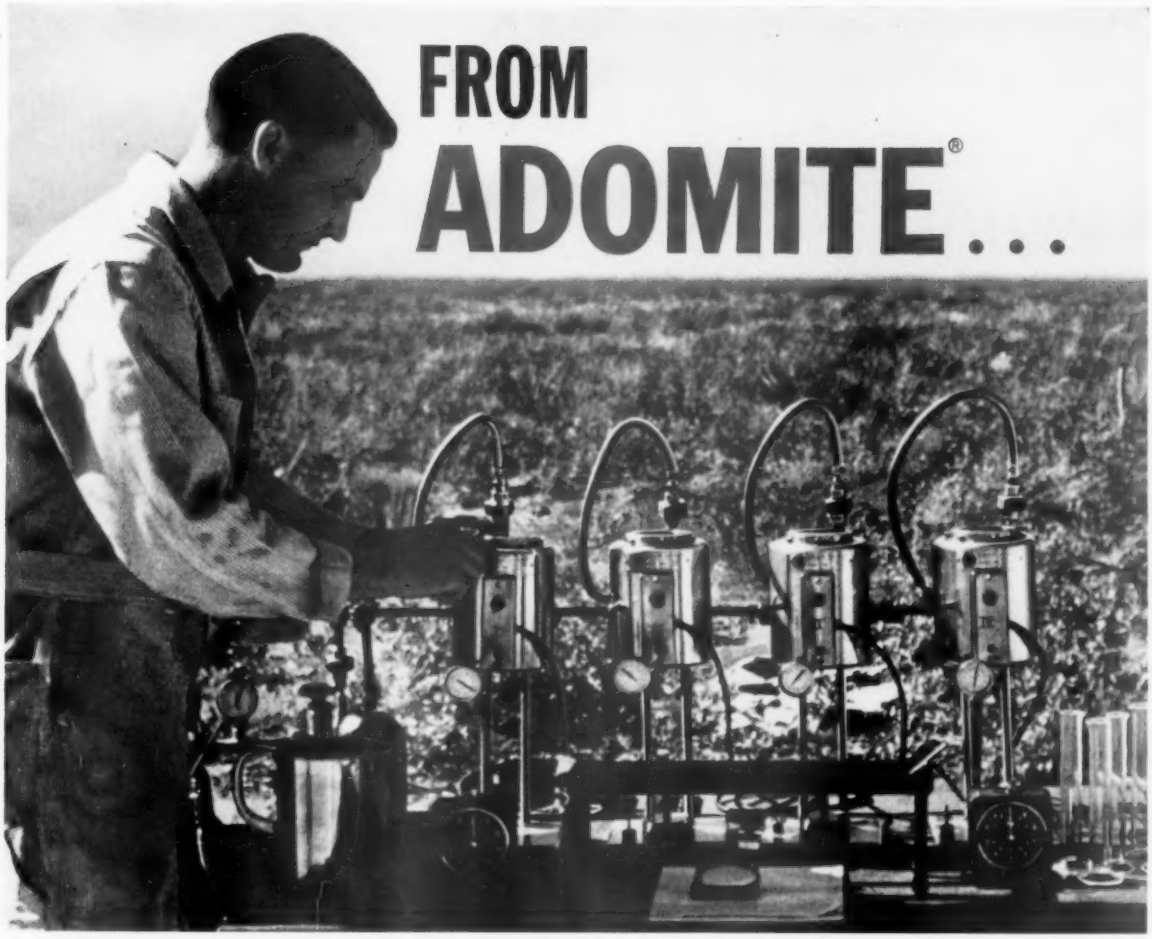

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Computers Are Becoming Accurate, Reliable Enough to Run Processes

The first computer to control a refinery unit has been doing its job for only two months, but already many processors and equipment makers alike are calling it "the foot in the door" to more automatic, more efficient petroleum processing.

Petroleum processors—long skeptical of the need for the feasibility of computer-controlled refining units—now appear ready to hop aboard the "automation bandwagon."

Processors' views on computer-controlled refining units still vary widely—but not nearly so widely as they did 2½ years ago when PETROLEUM WEEK sampled their opinions on the subject (PW—Nov.16'56,p71).

Although processors are still not of one mind on computer-control, their composite outlook has shifted noticeably toward a more sympathetic position on the issue.

Some of their recent actions show just how great the shift has been, and how much greater it may become.

Processors are now moving to apply what they have learned about computer control of process functions to computer control of complete processes.

The oil industry has long worked to develop more complex automatic process controls. Many attempts have been made over the years to develop, improve, and apply these specialized controls. But only with the advent of reliable electronic devices has there been any significant increase in processors' confidence in these controls.

The most recent and the most spectacular project along these lines was the "first closing of the loop" for complete automatic computer-control of an onstream process—done by Texaco Inc. last month on its 1,800 b/d cat polymerization plant at its Port Arthur (Tex.) refinery.

Texaco is using a special desk-size computer made by Thompson-Ramo-Wooldridge Corp. to operate the unit (PW—Apr.10'59,p38). The computer is linked directly to the process controller set points, and repositions these set points, thus automatically maintaining optimum operation.

But processors have been building up to the closed-loop operation for some time.

Paul D. Barton, director of advanced management and methods for Sun Oil Co., points out that work in this field has brought forth analog computer control of chemical feeding, and hydrogen-sulfide stripping of waste water; various highly-accurate blending schemes; and operator guidance based on stream analysis.

And Barton points out proudly that Sun, "as early as 1937, used a central control device in the operation of a fixed-bed catalytic cracking device."

But the current growing emphasis on computer control of an entire process is a horse of another color. Here are some of the recent steps processors have been taking toward this end:

In 1957, well before the Texaco announcement, Phillips Chemical Co., owned by Phillips Petroleum Co., quietly installed a Beckman Instruments, Inc., EASE digital computer to monitor an ethylene unit at Sweeney, Tex.

Another "supervisory" application of computer control in oil processing was made last year by Humble Oil & Refining Co. A small, inexpensive, special-purpose analog computer made by Southwestern Industrial Electronics Co., one of the Dresser Industries, was installed to control the operation of a distillation tower at Humble's Baytown (Tex.) refinery (PW—Jun.13'58,p62).

The tower, part of a desulfurization unit, cuts hexanes and lighter overhead streams from its charge stock, desulfurized light crude.

The computer regulates vapor rate in the tower by computing the tower's vapor capacity and its actual vapor rate, and then controlling the reflux rate continuously to achieve this maximum.

This week, a Humble representative gave these results of the Baytown computer control program to the midyear meeting of the API's Refining Division:

- "It works."
- "Good reliability, accuracy, and service factor can be achieved . . ."
- "Unexpected factors crop up . . ."
- "Control objectives have to be carefully studied . . ."
- "Economic evaluation is difficult but essential."

Esso Standard Oil Co. has also been using computers in a supervisory capacity for some time at its Baton Rouge (La.) and Bayway (N.J.) plants.

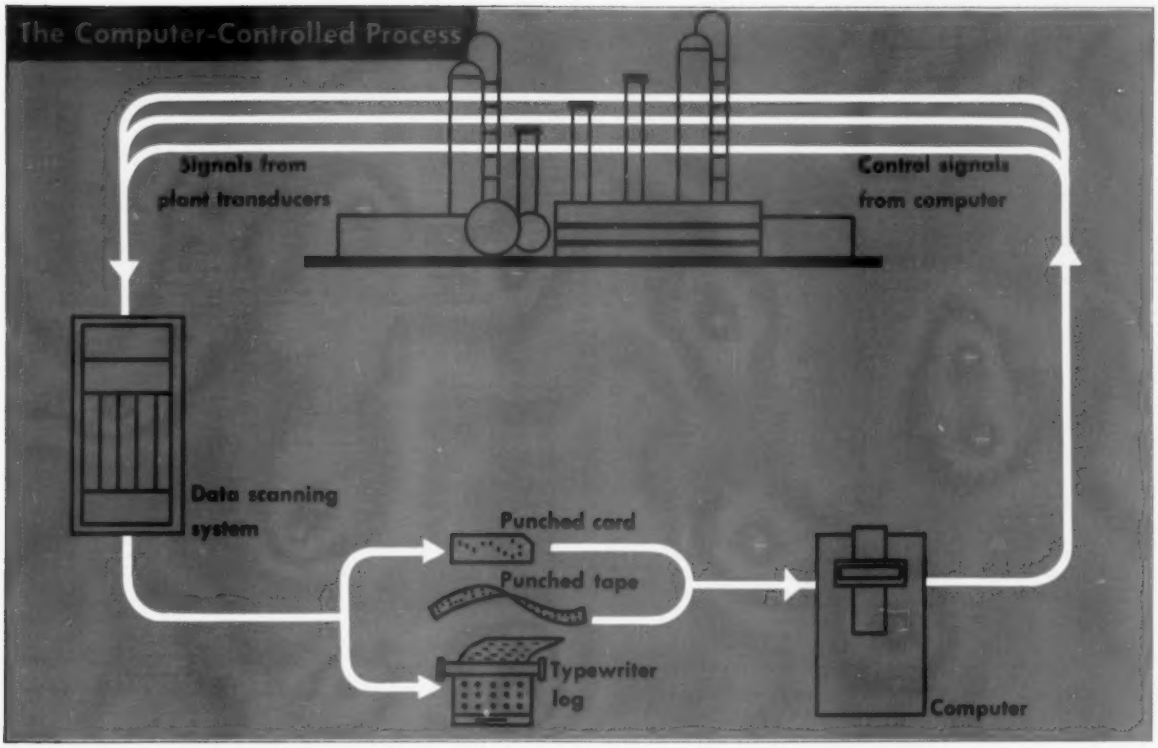
Universal Oil Products Co. recently announced that it is working with Daystrom Systems, a division of Daystrom, Inc., in the application of digital-computer control to pilot plants (PW—Mar.13'59,p15).

A computer-controlled cat reformer pilot plant has been built and tested by the systems division of Consolidated Electrodynamics Corp. for Esso Research & Engineering Co. at Linden, N.J. (PW—Feb.14'58,p47).

SPECIAL REPORT

COMPUTER PROCESSING

SPECIAL REPORT



"CLOSED LOOP OPERATION," shown in basic terms, will provide computer control of processing with only a standby operator.

And two majors, Standard Oil Co. (Ohio) and Sun Oil Co., have entered into programs with computer makers to study methods and feasibility of using computer controls in their refineries.

Sohio has a working arrangement with Thompson-Ramo-Wooldridge to study the potential of digital computers in this work; the type of instrumentation needed; and what approach the company can best afford.

Sun has an agreement with Genesys Corp., West Coast subsidiary of Chance Vought Aircraft, Inc., to study process automation "free from preconceptions" on the subject (PW—Feb.27'59,p28).

Sun's approach to the problem of computer control is double-barreled. Besides the Genesys program, the company is testing an Opcon optimizing controller, made by Westinghouse Electric Corp., on a distillation column at its Marcus Hook (Pa.) refinery (PW—Jan.9'59,p11).

Other processors, large and small, are interested in the concept of computer control; some are actively doing spadework in it but are not yet ready to discuss their work publicly.

With this foot in the door, a growing number of refiners and computer-makers alike now look forward to a "happy future" in the computer-control of processes.

This point of view, not long ago considered quite radical by a vast majority of processors, is now perhaps only a few shades left of center. Its reasoning sets up this way:

Computers have been, are now, and will be used to calculate for more efficient process operation, an "off-line" function.

Initially, most "on-line" computers for processing will be installed as supervisory equipment, without direct feedback to control the system. These installations will directly guide the operator in controlling a system.

But, this outlook concludes, there are processes requiring more precise control than is possible with manual control of process operating conditions—particularly where product quality does not permit averaging—and it is here that the computer-control of the process itself will be necessary.

Consolidated Electrodynamics is specific on this point: "Computers will find their best applications in those plants where throughputs are high and feed and product changes are frequent."

The pilot-plant atmosphere is frequently mentioned as an ideal "grooming place" for such computer control.

In these plants, J. M. Plummer, of Leeds & Northrup Co., contends, "computers can work broadly to supply many of the answers that processors need to learn in order to get more efficient operation from their plants and processes."

R. I. Van Nice, of Westinghouse's new products engineering department, also feels that the first use of computer-controlled processing should be in the laboratory and

continued ▸

And Barton points out proudly that Sun, "as early as

Co. at Linden, N.J. (PW—Feb.14'58,p47).

SPECIAL REPORT

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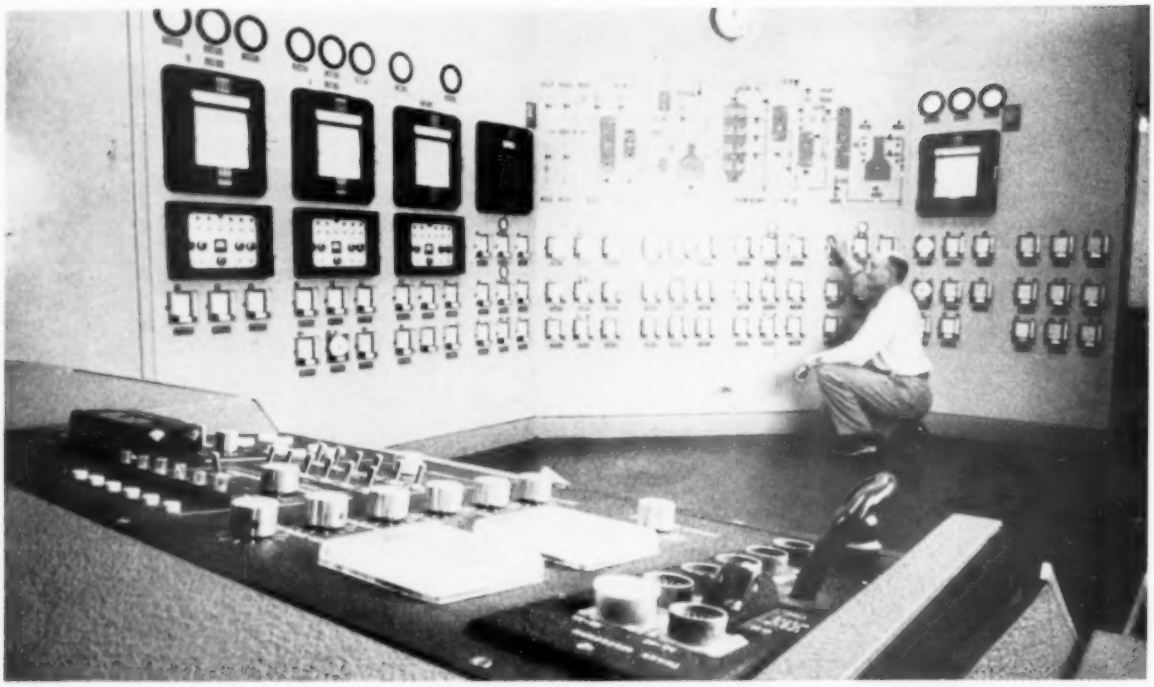

COMPUTER ACCURACY is critical in process control. One view: Computer reliability must approach 100% for effective control.

pilot plant. But Van Nice is quick to add that the second step will be in "highly instrumented plants carrying out well-known processes, preferably with high throughput so that even a slight improvement will give a fast payout."

How much effect will computer control of processing—when and if it comes to full maturity—have on processing in general? Although there is much debate on this point, it now seems quite possible that the fast-response control of a computer might even have a direct effect on process design.

L. S. Michels, of Bendix Aviation Corp.'s special products department, figures that future computer control definitely will affect process design.

"First," Michels says, "will be the attempt for more complex or rapid processes than can be accomplished with manual control; and second, the planning of new plants with automation in mind so that proper instrumentation is installed."

Melville Stein, president of Leeds & Northrup, feels that, "It is interesting to speculate on what will place the ultimate limit on computer control of continuous industrial processes.

"Will it be the limitations of computer controls, or will it be the limitations of the process itself? I feel the limit will not be the controls. I expect a see-saw pattern. Probably the limit will be at the point of diminishing returns."

Consolidated Electrodynamics is more sure that computer controls will affect process design. The company says, "In many cases the process design limits the controllability of the plant . . .

"With a fast-response control, undesirable holdup can be reduced significantly in future plants. Equipment can be made smaller as a result of this, with the resulting saving in equipment cost."

While the lack of fast-response, computer-controlled process controls has not been a limiting factor in current operation, this lack has precluded certain design changes in processing plants.

N. E. Weber, of Foxboro Co.'s systems engineering division, feels that, "For some time, control equipment will have no bearing on process equipment design. Possibly at some future date, the availability of computer technology will allow better process design."

J. F. Skelly, of M. W. Kellogg Co., says, "In addition to higher operating efficiencies, we expect that the maturing of computer control techniques will revive interest in the high-speed thermal processes."

But the promise of fast response in computer control doesn't appear as a panacea to processing problems to all refiners.

E. D. Reeves, vice-president of Esso Standard Oil Co., contends that the hold-up capacities and the lag times are so great in today's giant refining units that there is no particular advantage to very-fast-response instrumentation.

And W. J. F. O'Conner, head of Lummus Co.'s instrument department, agrees: "While process design has called for and will continue to call for further development of old and new measuring and analyzer devices, fast-response control will, for some time yet, probably find most use in control of machines and mechanical devices."

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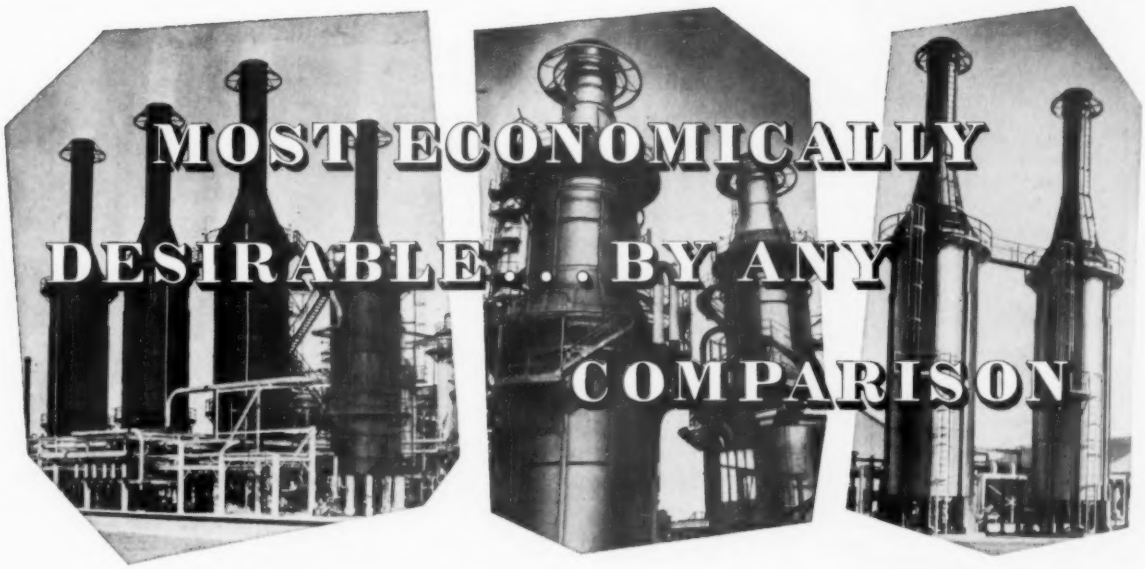

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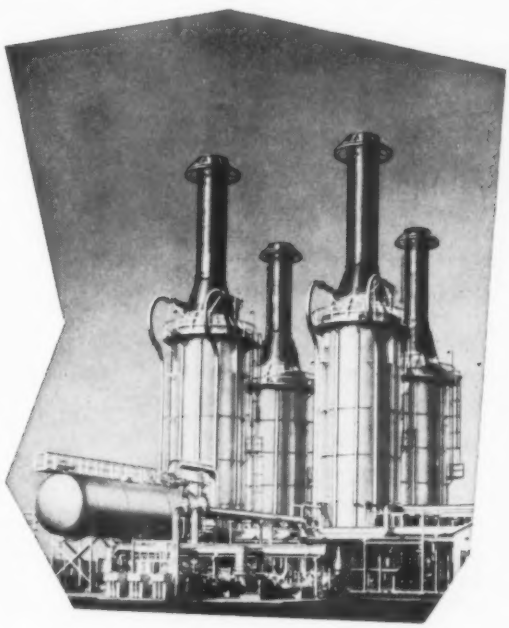

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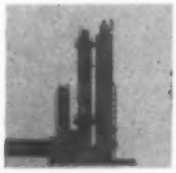

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SPECIAL REPORT

COMPUTER PROCESSING

SPECIAL REPORT

Better Control Hardware Is on the Way

To help buttress the coming computer-control of processing, many manufacturers are ready to furnish what they call "greatly improved hardware."

Many companies (besides those already named) have indicated that they are now, or soon will be, active in developing computer-control systems for use by refiners.

Most of these companies emphasize that early computers did not have the reliability needed for onstream application with process-control units, and that improved circuitry and transistorization have improved computer reliability greatly.

These future developments in automatic control equipment, according to both makers and potential users, will mostly be the logical extension of the more significant equipment developed during the past five years.

A spokesman for this point of view, Geoffrey Post, of Genesys, says that the increasing use of electronic controllers and digital computing with optimizing techniques are the most significant developments in the field to date.

He predicts that the next five years should see "full correlative control" of processes.

A major oil company user, on the other hand, feels that primary sensing elements for measurement of flow and temperature-change rates, although they have been improved, will get increasing development in the years immediately ahead.

More specifically, equipment makers and users cite these coming advances.

- "Standardization of devices and subsystems for measurement and control of variables such as pressure, temperature, flow rate, and electrical quantities" (G. M. Muschamp, vice-president, engineering, Minneapolis-Honeywell).
- "Increased reliability of general-purpose digital computers, accompanied by a decrease in the over-all size of equipment, point toward greater acceptance of digital computers for the control of continuous process units" (T. S. Grier, petroleum division, Remington Rand).
- "More dependable devices for stream analysis; reliable electronic components and equipment and their use for control and data-processing; and a future coordination of sensing elements, input-output devices, and programmed master controllers" (Paul D. Barton, Sun Oil).
- "Development of improved digital-to-analog and analog-to-digital converters. . . The next five years will see developments in reliability of computers and input-output equipment to allow more reliable automatic control of processes" (L. S. Michels, Bendix Aviation).
- "For the next five years, the instrument industry will develop and improve analog and digital computers for process control; improve transducers for pressure, flow, level, and conductivity; and improve on-stream analyzers, because these analyzers are the keystones to further use of improved electric control systems and computer control systems" (J. M. Plummer, Leeds & Northrup).
- "Development of reliable composition analyzer controllers such as the chromatograph in-line analyzer, with

continued

The Lineup of General-Purpose Digital Computers Available for Process Control

	Thompson-Ramo-Wooldridge	GPE Controls; Librascope	Daystrom Systems	Panellit	General Electric
Computer	RW-300	Libratol 500	Daystrom computer	Panellit 609	GE 312
Internal number base	binary	binary	binary	binary	binary
Bulk memory type	drum	drum	magnetic core	magnetic core	drum
Logic	diode	diode	diode-transistors	magnetic core	———
Weight	600 lb.	1,000 lb.	4,000 lb.	———	3,000 lb.
Size	desk size	30" x 42" x 60"	4 standard racks	———	76" x 108" x 24"
Power requirements	½kw, 120v, 60cy.	1½kw, 1700v, 60cy.	"Less than 2kw"	———	4kw, 120v, 60cy.
Approximate price (basic unit)	$98,000	$75,000	"Varies depending on application"	$100,000	"Varies depending on application"
Installations (1/1/59)	Texaco Inc., Port Arthur, Tex.	———	———	———	———
Units on order (1/1/59)	Monsanto Chemical Co. B. F. Goodrich Chemical Co.	Public Service of Colorado	Universal Oil Products Co.	System just being made available	"Two systems on order for 1959 delivery"

Note: Minneapolis-Honeywell Regulator Co. is in development with its D-290 general-purpose digital computer, and Leeds & Northrup Co., with Philco Corp., is designing another one.

Data: Arthur H. Freilich, Burroughs Corp.

COMPUTER PROCESSING

AT BATON ROUGE, La., Esso is using a computer to "advise" this unit operator, and to gain computer-processing experience.

further development of specific composition analyzers and computer applications" (Consolidated Electrodynamics).

- "The development and application of pure electronic instrumentation and control are the most significant developments to processing operations in the past five years. These will eventually lead to the marriage of the electronic computer to the processing unit and/or plant" (Universal Oil Products Co.).
- "Application of static switches using semiconductor devices to replace relay circuitry, with the future seeing very-high-speed digital computers approaching the speed of analog computers" (Southwestern Industrial Electronics Co.).

All this is not to overlook the likely effect of comparatively newer developments in computer-making. The use of "solid state" components, for instance, is expected to play a most important role in the computer-control systems processors will use in the future.

Solid-state components are transistors to replace vacuum tubes; printed circuits to replace bulky bundles of wiring; magnetic-core amplifiers, faster in response than magnetic drums; and other miniaturized components of the computer system.

Says Bendix's Michels, "I believe it is universal opinion that computers and control devices of the future will use solid-state components, including transistors, but also including other solid-state elements. This will, and should, go as fast as possible under the state of the art."

Weber, of Foxboro, is just as sure about such components: "We take it for granted that computers should be transistorized, and do not believe it matters how far this trend will go. It will obviously go as far as it can or has to go to provide process people with adequate equipment."

Leeds & Northrup makes this point: "Any step toward obtaining better reliability is a step in the right direction and one that must be made. Transistorization or adaptation of various solid-state devices in electronic equipment is a step toward eliminating potential trouble and increasing reliability."

Just as important as the advances in hardware, many feel, is the new attitude, the new philosophy, growing up with a new generation of processors which recognizes a need for a new approach to process control.

Barton, of Sun Oil, cites the "development of a control philosophy," jointly by users and manufacturers, as one of the major recent developments that have taken place in automatic control.

He believes that this new outlook, which recognizes the need for more sophisticated equipment and methods, will lead to the development of better electronic controls. Eventually, Barton feels, day-to-day process operating decisions will be transferred from the line operator to the operating foreman or even higher management levels, permitting coordination of separate but related operating areas.

"The tremendous growth in the number of people qualified to analyze a closed-loop problem," says Beckman

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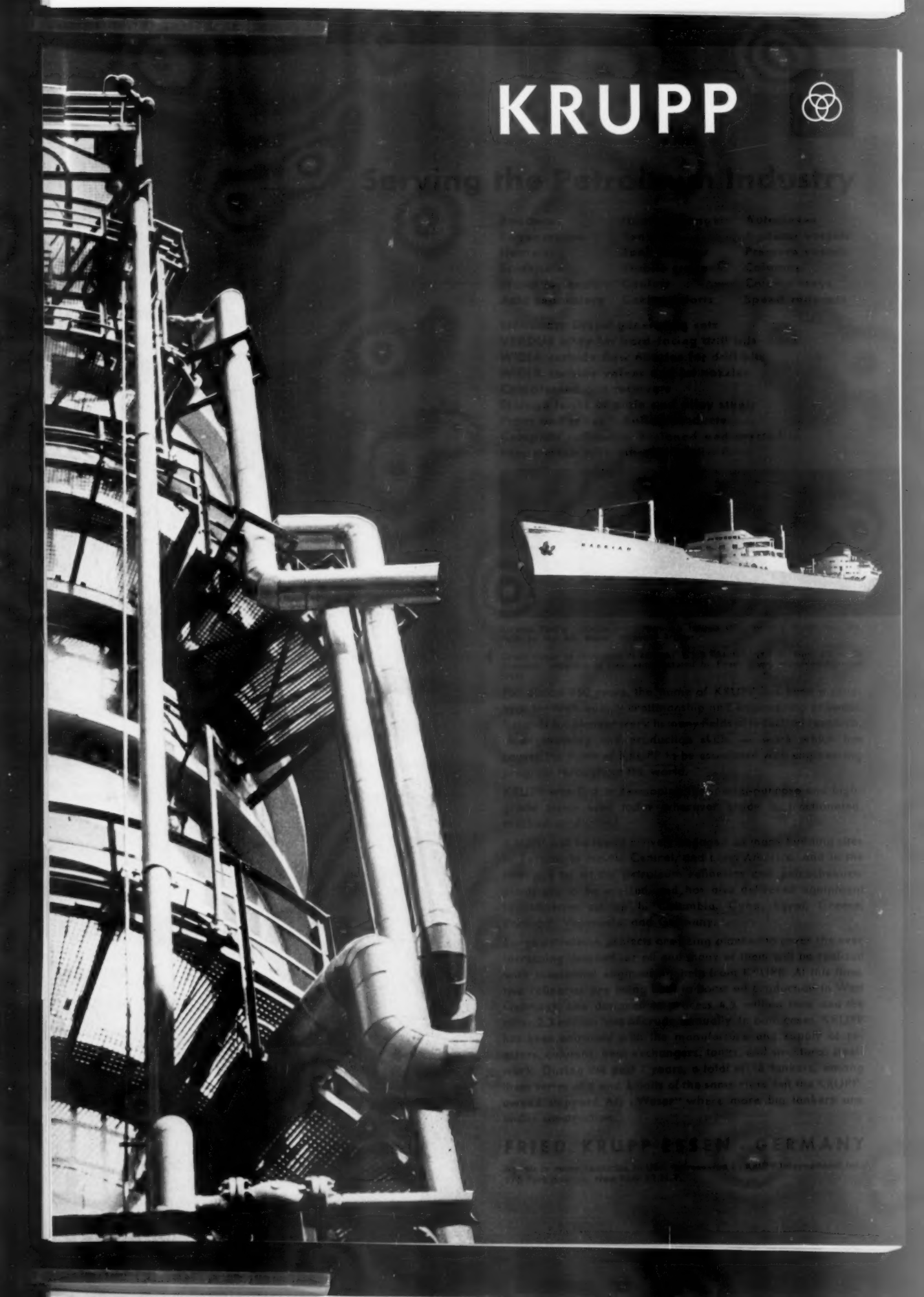
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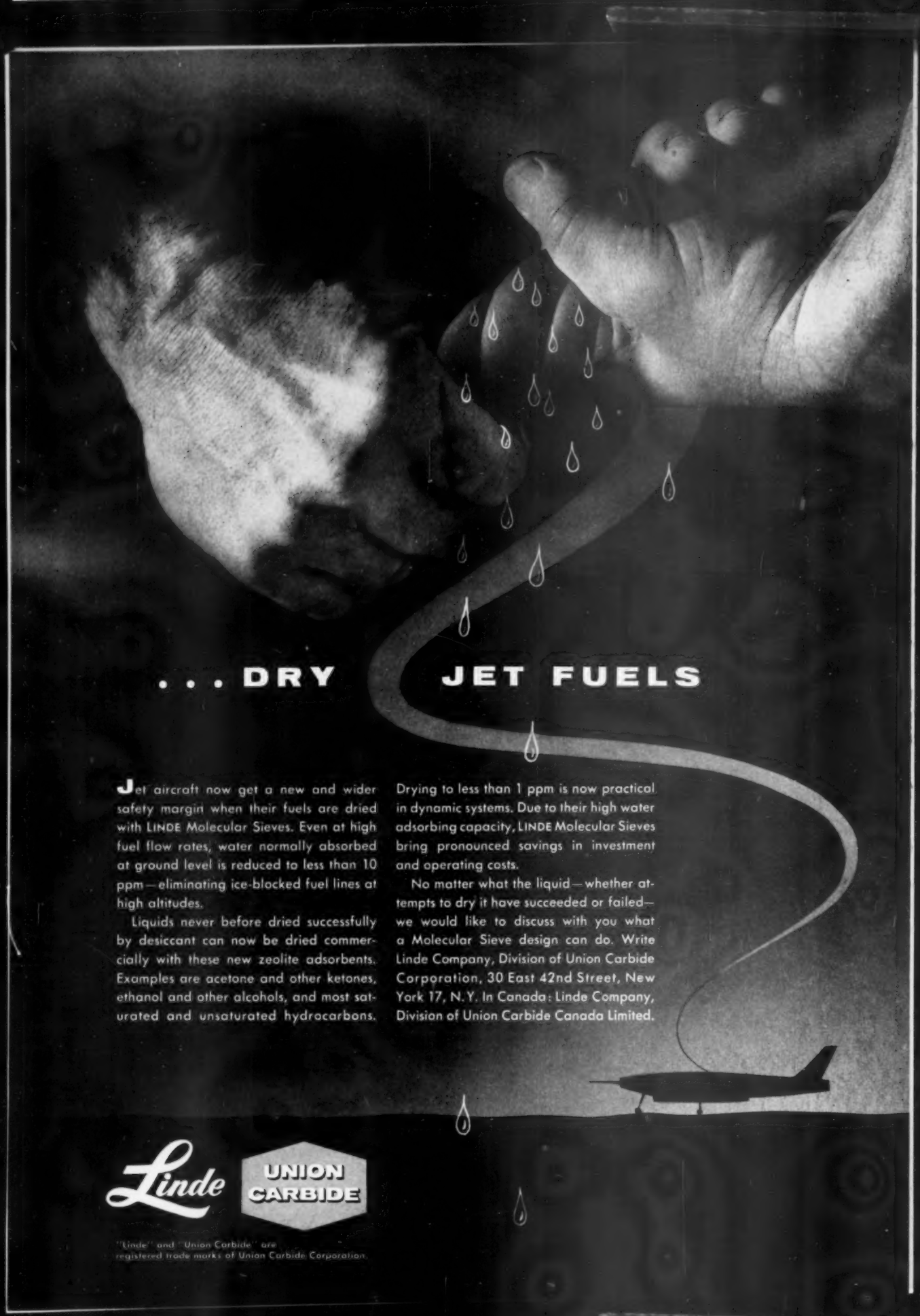
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Jet aircraft now get a new and wider safety margin when their fuels are dried with LINDE Molecular Sieves. Even at high fuel flow rates, water normally absorbed at ground level is reduced to less than 10 ppm—eliminating ice-blocked fuel lines at high altitudes.
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Drying to less than 1 ppm is now practical in dynamic systems. Due to their high water adsorbing capacity, LINDE Molecular Sieves bring pronounced savings in investment and operating costs.
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Instruments' James L. Fowler, is the most significant recent development in automatic control.

"The number of people entering the field with this qualification during the past five years," he says, "is comparable to the total number educated in this field prior to that period.

"This means that a new generation, educated to look at plant design and control on a system basis rather than on a 'trial-and-error' basis is now in industry."

This "mental climate" on process control by computer is being greatly aided by the increasing number of joint projects between processors and equipment makers to develop new process-control techniques. In such programs, the processor furnishes the information on the reaction, the equipment maker the hardware knowledge.

This is how Texaco's Port Arthur poly unit computer was born. And the approach is expected to bear similar fruit for other processors involved in such study.

Furthermore, the idea is spreading, with more oil companies expressing an interest in working with the manufacturer.

A spokesman for one major not yet involved in such work says that his company would already be participating in such a joint program but for patent rights and financial arrangements. He expects these problems to be resolved before too long.

Processors interested in such study deals will find equipment-makers anxious. Weber, of Foxboro, is blunt when he says, "The trend for processors and instrument makers to enter into joint programs indicates the relative ignorance on both sides, and a desire to help each other.

"This is believed to be a temporary trend, which can only last as long as a state of ignorance prevails. We are in a number of such programs on a small scale. It is merely a more advanced form of the usual application of engineering done by leading instrument suppliers."

Cost, 'Tradition' Will Slow Progress

Progress toward widespread computer control of processes will have to overcome some mighty serious restraining factors however. Although some processors and equipment makers disagree, it now seems that ignorance in the vast area of "process dynamics" is the main deterrent to wide application of computers.

IBM spokesmen are among the strongest supporters of this point of view. They contend that even realistic models for petroleum processes are "virtually nonexistent", and that until mathematical formulation of the controlling elements of each specific process is known more precisely, it is not practical to develop new hardware for process control.

IBM's study of process control dates back two years. A year ago it organized an industrial process control department to perform systems analysis, product planning, and equipment development.

Nor is IBM alone in its view:

"Nobody knows completely how even a simple process column works," says one oil company representative. "We don't even know what 'oil' is.

"There is gross ignorance in the area of how to make, use, and apply automatic-control equipment to over-all process. Our operations today are on the basis of empirical relationships."

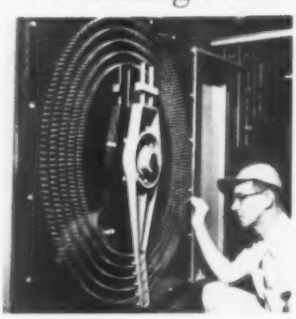
Muschamp, of Minneapolis-Honeywell, suggests, "The problem seems to be more one of learning what to do rather than how to do it."

And Beckman's Fowler says, "The most limiting factor in the way of greater computer application for process supervision is the lack of engineers with adequate knowledge of process dynamics and computer experience."

Michels, of Bendix, says that investigation of process dynamics, although progressing "at an acceptable rate,"

continued ▸

Sun's 'Granddaddy of Refining Automation' Worked in 1937



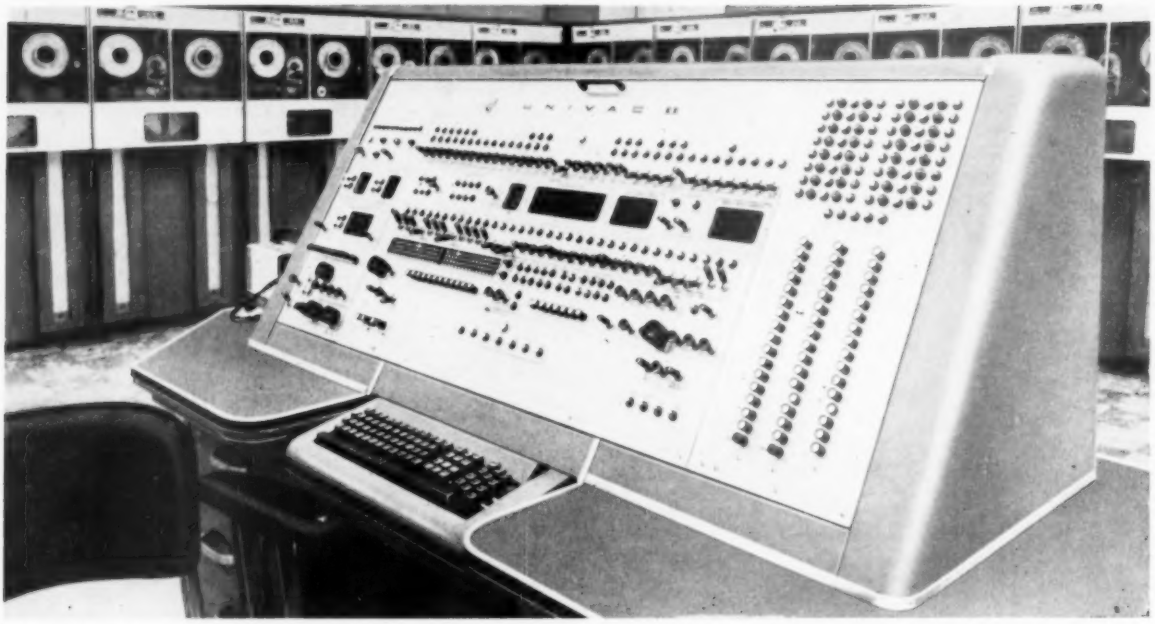
Sun Oil Co., one of the many oil processors now looking into automatic process control, used a primitive controller on a cat cracker as early as 1937.

Known as a cycle timer, the control worked like a giant clock. As the timer hand swept around the dial, it opened and closed 72 giant, motor-driven valves with the necessary precision. A panel with 900 contact points gave the timer amazing flexibility.

●●● SPECIAL REPORT ●●●●●●●●●●●●●●●

COMPUTER PROCESSING

●●●●●●●●●●●●●●●● SPECIAL REPORT ●●●



COMPUTER SIZE for best process control is debated. Some favor large, all-purpose machines; others small, specialized models.

has not yet arrived at "the point where one may directly apply computers to all processes."

A minority dissent on the importance of process dynamics in applying computers to control runs this way:

- "Precise process control is possible with only a gross, or over-all, knowledge of the system's behavior, by using strong feedback methods to insure stability, and a correlative computer" (John F. Davis, Genesys vice-president).
- "Process dynamics are not that difficult to find out," once other problems are resolved (Weber, Foxboro).
- "If process dynamics cannot be determined before initial plant startup, they can be determined through the proper selection of and employment of the computer and its appendages that are ultimately necessary for control of the operation" (O'Conner, Lummus).

Reliability of computer control is still a question of great importance in the minds of many processors—and even some equipment makers. Until the question is answered in more strongly affirmative terms, doubts will persist, and process control by computer will spread only slowly.

Michels, of Bendix, submits that, "The reliability of computers is only now becoming satisfactory to trust in large processes. And even though computers become more reliable, investigations as to methods of controlling the process when there is a power interruption, or the like, must be made."

Plummer, of Leeds & Northrup, says the "operating time factor must be 99% or better over a period of at least several months." And without high reliability, approaching 100%, Remington Rand's Grier feels, "the economic advantages which processors would get through computer process control will not be realized.

"Computers presently in use or under development for critical military uses," Grier says, "are achieving this high degree of reliability, and indicate that future commercial computers will meet the reliability requirements of process control."

Minneapolis-Honeywell's Muschamp lays it on the line, however, when he says, "Computers are simply not yet reliable enough to be depended upon completely for in-line applications."

Post, of Genesys, admits that the past record of electronic equipment has hurt the manufacturers. But he contends that "present-day equipment is far more reliable."

Other reactions on computer reliability:

- "The onstream reliability of electronic equipment has been unsatisfactory for refinery control use in the past, is considerably improved in the present, but must be much more reliable to obtain wide acceptance in the future" (Barton, Sun Oil).
- "The onstream reliability of computers is an unknown quantity, but could be guessed at as being quite low, getting better, and eventually being good enough" (Weber, Foxboro).
- "Data-acquisition equipment has not performed with the necessary reliability. The primary difficulties seem to center in the mechanical devices, the relays, typewriters, tape punches, etc. In the future, it is likely that computer control and data-acquisition equipment will provide much greater reliability, through use of solid-state and static components" (SIE).
- "The importance of reliability is not yet appreciated by electronic manufacturers. Difficulties in pilot installations should initiate further improvements" (J. D. Strong,

continued ▶

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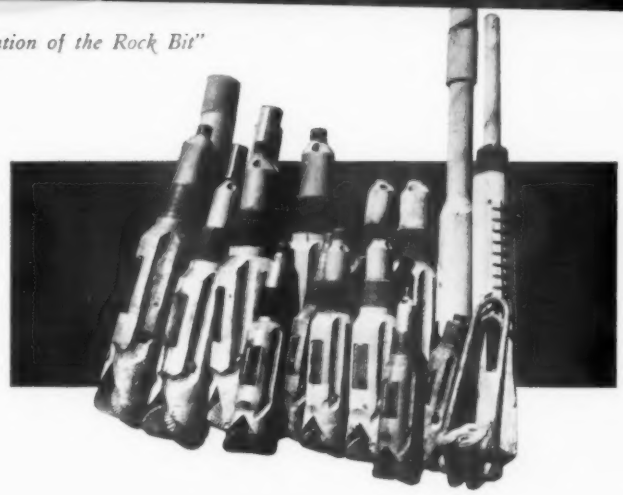

HUGHES BITS THAT MADE HISTORY

TODAY's faster-cutting, longer-lasting Hughes bits are the product of research and an intimate knowledge of drilling problems gained from the vantage point of the rig floor for the past half century.

The first of the early bits to reflect this close teamwork between research and the field were the Reaming Cone and Simplex bits.

The Reaming Cone bit, introduced in 1917 and manufactured through 1921, was the first bit to be equipped with reamers to hold the gage of the hole. However, the water courses in the bit tended to washout. To overcome this problem, Hughes developed the Simplex bit with a replaceable wash pipe. This made it possible for one bit body to outlast many sets of cones. The Simplex was also equipped with longer, more efficient reamers, that were easier to change than those on the Reaming Cone bit.

To accommodate the larger reamers and wash pipe, the Simplex body was made longer. In the larger sizes, it was a huge bit, weighing up to three tons.

The Simplex was introduced in 1921 and soon took over completely from the Reaming Cone bit, reigning supreme in the oil fields from late 1921 through the early 30's. It set new drilling records; drilled millions of feet of hole and advanced rotary drilling throughout the world.

Unit cones, introduced with the Simplex bit, made the bit easy to dress. But it was the self-cleaning unit cones, introduced in the middle 20's, that gave the Simplex its widest acceptance and gave rotary drilling its biggest boost by increasing the variety of formations the rotary could drill. The self-cleaning cones also led directly to the next dramatic rock bit development: the Unit bit—the forerunner of today's two-cone and Tri-Cone bits.

With the introduction of the Unit bit the Simplex faded into obsolescence. The Unit bit eliminated the expense of dressing bits on the rig floor and the purchase of costly bit heads and parts, greatly reducing the operator's bit investment. And it accelerated a Hughes objective that has continued through the years—reduction of drilling costs through improved bit performance.

In the painting at the left—the artist, using old photographs as a guide, has re-created a typical Mid-Continent rig floor scene in the mid-20's. On the floor at the left of the rotary is a Hughes Reaming Cone bit. Although rapidly passing from the picture, the Reaming Cone bit, in the larger sizes, was saved by operators to drill rock encountered occasionally in surface digging. Stacked to the right of the rotary are extra Simplex bits and a Disc bit, developed by Hughes as a soft formation bit before the advent of self-cleaning cones. Large reproductions of the painting, suitable for framing, are available for the asking. Write: Advertising Department, Hughes Tool Company, Box 2539, Houston.

HUGHES TOOL COMPANY

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Consotrol Control Station undergoing final calibration. Full 4-inch chart width is one of many advances in small-case panel instruments introduced by this Foxboro development.

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Creative Design and Manufacture of Instruments and Instrument Systems for Measurement and Control of Process Variables. The Foxboro Company, Foxboro, Mass., U. S. A.

SUPPORTING HARDWARE for computer control of refining units, according to equipment makers, is in for big improvements.

new products planning coordinator, Electronic Associates).

Another restraining factor, the relatively high cost of process control by computer, may make many prospective users shy away, and may limit some users to applications only in very-large-volume processes.

Too many companies feel that they cannot justify an expenditure of $100,000 to $200,000 for computer control, Leeds & Northrup has found. And estimates for a complete process-control computer system (including accessory input, output, and sensing equipment) range much higher. Post, of Genesys, says that such a system now costs between $250,000 and $500,000.

Furthermore, almost all the equipment companies say that the trend in computer costs is up.

Michels, of Bendix, however, cautions against overemphasis on initial cost:

"Costs are an incidental factor. I believe it can be shown that the costs are not great in relation to the return that can be achieved."

To support this contention, he says that a user can buy input and output equipment for under $100,000, and lease the computer itself. This, he says, not only reduces immediate financing costs, but is a hedge against obsolescence.

And even though a new, more sympathetic attitude toward computers is evident among oil processors, a specific "education" in the advantages of computer-controlled processing is a must before real progress can be made in this field, according to computer manufacturers.

Beckmen's Fowler believes that, "Management of process industries must be educated to the advantages of automatic process control. And in most cases, this education can and must come from their own technical personnel."

A spokesman for SIE says, "Users are as yet insufficiently aware of the workings of the computer for their limitations and advantages to be fully understood."

Weber, of Foxboro, agrees that lack of education on computer applications—"knowledge of where they will do some good"—has been a definite limiting factor in wider computer use.

This education, computer makers feel, must also extend to the training of personnel to operate and maintain process-control computers. And this type of employee is in very short supply today.

"Process users of computers and other electronic process control equipment must first learn to keep cool and keep the equipment cool," according to O'Conner, of Lummus. "They must have trained personnel. To obtain proper training they must provide training from outside the bounds of their own organization as well as from within."

Consolidated Electrodynamics feels that, "The main problem facing processors in the use of computers is that men with the best technical qualifications are needed to make best use of this equipment, and the training time in the techniques of programming, etc., is often quite lengthy.

"The current trend," SIE points out, "is for computer manufacturers to supply personnel for these systems studies. Secrecy requirements, personnel transportation problems, and semantic difficulties limit the effectiveness of this arrangement. A few companies have formed the nucleus of such systems groups, especially in research organizations.

"This effort should be accelerated."

Says Barton, of Sun: "It takes a long time (five to ten years) to develop a group of people at various levels of responsibility to successfully utilize the potentials of computer applications.

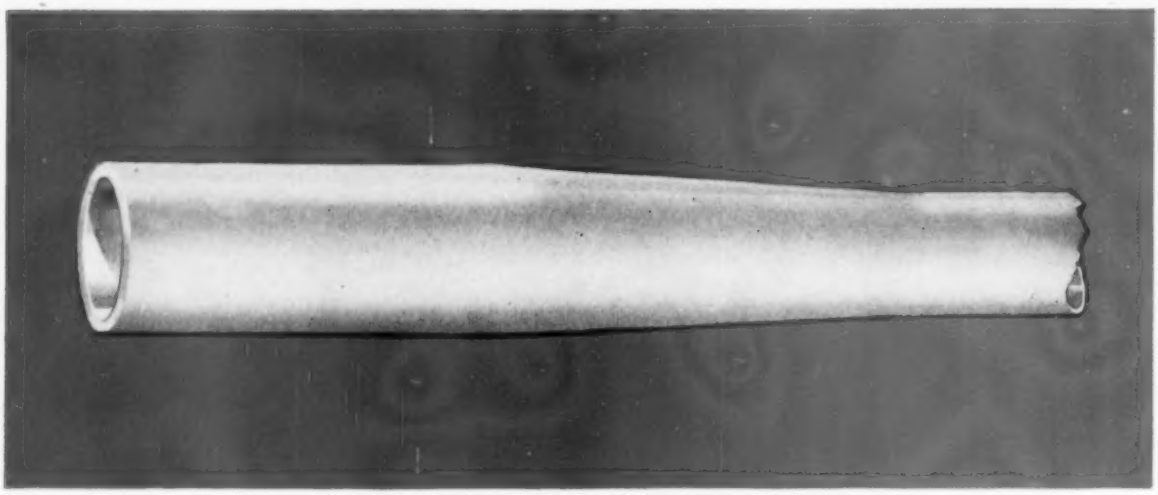
"Industry cooperation can help."

The need for education in computer applications as a whole—as well as applications specifically in the process industries—may well be met by the fast-increasing number of formal courses on the subject.

Colleges and universities, the American Petroleum In-

continued ▸

Put strength where it counts!



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Reynolds Heavy-End-Pipe is available in Schedule 40 equivalent and Schedule 80 equivalent sizes, in 40 ft. lengths. Ends have the same diameter and thickness as standard sizes, so standard fittings can be used. Also, Heavy-End-Pipe can be used interchangeably with other standard pipe.

Like all Reynolds Aluminum Pipe, H-E Pipe costs much less than other corrosion resistant piping with equal performance. It won't contaminate the fluids it handles; it resists corrosion by most process liquids. More and more companies are changing to aluminum piping because it is lightweight, non-sparking, easily formed, joined, welded.

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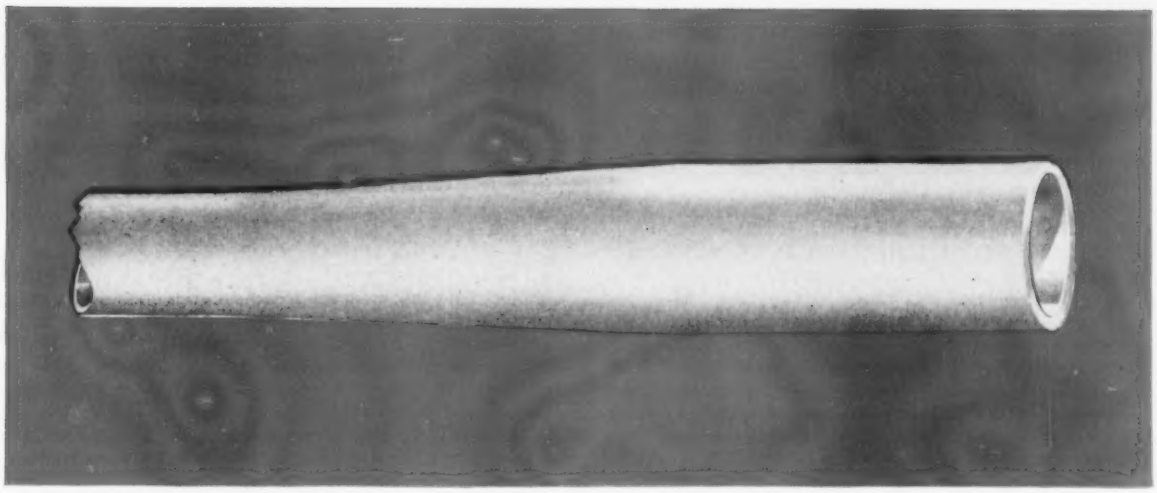

HEAVY-END-PIPE

... cuts weight... simplifies design... strengthens joints

REYNOLDS HEAVY-END-PIPE DESIGN DATA

Schedule 80 Equivalent

Nominal Size	Major (Heavy End) O. D.	Major (Heavy End) Wall	Heavy End I. D.	Aprox. Heavy[1] End Length	Minor Body O. D.	Minor Body Wall	Minor Body I. D.	Average[2] Weight Per Ft.
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Pounds
3	3.500	.300	2.900	10	3.130	.190	2.750	2.18
3½	4.000	.318	3.364	10	3.616	.201	3.214	2.68
4	4.500	.337	3.826	11	4.102	.213	3.676	3.24
5	5.563	.375	4.813	11	5.137	.237	4.663	4.53
6	6.625	.432	5.761	12	6.157	.273	5.611	6.33
8[3]	8.625	.500	7.625	12	8.107	.316	7.475	9.61
10[3]	10.750	.593	9.564	13	10.164	.375	9.414	14.36

[1] Length of heavy end exclusive of transition zone
[2] Based on 40 ft. length
[3] Standard length—40 ft. except 8" size max. length 30'; 10" size max. length 20'

Nominal Size	6061-T6, 6062-T6 Alloy				6063-T6 Alloy			
	Calculated Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5	Calculated Ultimate Bursting Pressure	Working Pressures Factor of Safety 3	4	5
Inches	psi	psi	psi	psi	psi	psi	psi	psi
3	4490	1497	1122	898	3205	1068	801	641
3½	4145	1382	1036	829	2960	987	740	592
4	3885	1295	971	777	2780	927	695	556
5	3475	1158	869	695	2490	830	622	498
6	3355	1118	839	671	2400	800	600	480
8	2970	990	742	594	2120	707	530	424
10	2815	938	704	563	2010	670	502	402

Schedule 40 Equivalent

Nominal Size	Major (Heavy End) O. D.	Major (Heavy End) Wall	Heavy End I. D.	Aprox. Heavy[1] End Length	Minor Body O. D.	Minor Body Wall	Minor Body I. D.	Average[2] Weight Per Ft.
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Pounds
3	3.500	.216	3.068	10	3.192	.137	2.918	1.63
3½	4.000	.226	3.548	10	3.684	.143	3.398	1.97
4	4.500	.237	4.026	11	4.176	.150	3.876	2.36
5	5.563	.258	5.047	11	5.223	.163	4.897	3.21
6	6.625	.280	6.065	12	6.269	.177	5.915	4.21
8	8.625	.322	7.981	12	8.237	.203	7.831	6.36
10[3]	10.750	.365	10.020	13	10.332	.231	9.870	9.11

[1] Length of heavy end exclusive of transition zone
[2] Based on 40 ft. length
[3] Standard length—40 ft. except 10" size max. length 30'

Nominal Size	6061-T6, 6062-T6 Alloy				6063-T6 Alloy			
	Calculated Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5	Calculated Ultimate Bursting Pressures	Working Pressures Factor of Safety 3	4	5
Inches	psi	psi	psi	psi	psi	psi	psi	psi
3	3180	1060	795	634	2270	757	568	454
3½	2900	967	725	580	2070	690	518	414
4	2700	900	675	540	1920	640	480	384
5	2360	787	590	472	1680	560	420	336
6	2150	717	537	430	1530	510	382	306
8	1885	628	471	377	1346	439	338	269
10	1718	573	429	344	1220	407	305	244

REYNOLDS ALUMINUM

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stitute and other industry groups, and equipment-makers themselves are now offering these courses for every personnel level from technician to top management.

Another area of great concern is that of payout. There appears to be no concrete, all-inclusive formula for telling whether computer control will be justified for a given process—short of installing the computer and evaluating its operation.

Agreement on this point is virtually unanimous:

"The answer, I feel," says Michels, of Bendix, "should be made by the user; the financial structure will vary from user to user.

"From the potential users I have talked to, some of the processes can write off the equipment in less than a year: There may be some other extenuating circumstances, however, such as labor problems and difficulty in shutting down the process while it is being instrumented, that do not have dollars-and-cents values applied to them, but still influence the decision toward process control."

O'Conner, of Lummus, is much more to the point: "A payout justification cannot be figured except in a few cases. The figures are mostly from assumption."

Consolidated Electrodynamics has this to say on payout: "It is not possible to make a realistic economic justification until a complete study of the plant has been made, including static, dynamic, and constraint analysis. The expense of such a study usually involves much time, money, and talent."

And SIE says, "The payout justification for computer controllers will only be determined after an installation has been in use for some period of time. There are always unexpected situations, which may add or subtract from the payout factor."

And again, Barton, of Sun: "Payout for computer control must be based on potential results as related to the limitations of alternate means.

There is also some question as to whether computers are not progressing more rapidly in their development than their "supporting equipment."

By supporting equipment, computer experts generally mean input-output equipment, primary sensing elements for operating conditions, and on-stream analyzers.

Consolidated Electrodynamics puts it this way: "The developments or improvements in primary sensing elements, transducers, etc., have not kept pace with the development of the general-purpose digital computer."

Leeds & Northrup points out that, "Stream measurements of course, are what determine most quickly when a product is on spec. Devices now available for this purpose are infra-red analyzers and chromatographic units, but further instruments for general purpose should and doubtless will be developed."

And SIE contends that, "Transmitters that convert a process variable to an electrical signal for computer input have been a limitation. There is a need for improved flow transmitters, level transmitters, and analyzers. Especially needed are transmitters that provide a digital output, so that expensive analog-to-digital conversion equipment is obviated."

Bendix offers this dissent: "Sensing elements, transmission, input, output, and central devices have pretty much kept pace with the desire to automate process industries."

But processors don't seem to agree.

One major told PETROLEUM WEEK that it definitely feels that "the development of quality-sensing elements has lagged." The company said that improvement in such elements will be necessary before it decides to adopt automatic controls.

And Sun says, "The development of primary sensing elements applicable to process control has lagged behind computer development and has therefore limited its application. This is also partially true of dependable input-output devices."

Finally, the pattern is not yet clear as to what roles analog, digital, general-purpose, and specific-purpose computers will play in automatic processing.

Opinions on "which computer for which use" vary all over the lot. Most-often expressed point of view, however, is, "we're not sure yet." Some of the comments on this point:

- "We see absolutely no reason for a computer designed specifically and only for generalized process control. There may be places where a special computer is the best thing to use, providing it is designed for the one application only. But a computer designed for general process control must have characteristics similar to those of a general-purpose computer" (Michels, Bendix).
- "General-purpose computers, both digital and analog, are too flexible and thus too expensive, and their performance too laboratory-like to represent a long-term solution to inline control problems. At present, no prediction can be made as to where, in the spectrum from special-purpose to general-purpose equipment, the field will stabilize" (Weber, Foxboro).
- "The case for the acceptability of general-purpose versus special-purpose computers is at present too indefinite to warrant a general choice. We feel that in terms of numbers of applications, the special-purpose (analog) computers will greatly surpass the general-purpose types" (Barton, Sun).
- "Simple, small-scale computers will be used at individual unit processes, that is, fractionators, absorption-strippers, reactors, etc., to maintain relations and cause optimum yields.

"The digital computer lends itself most practically to the overall plant control—since unit quantities are added and subtracted" (SIE).

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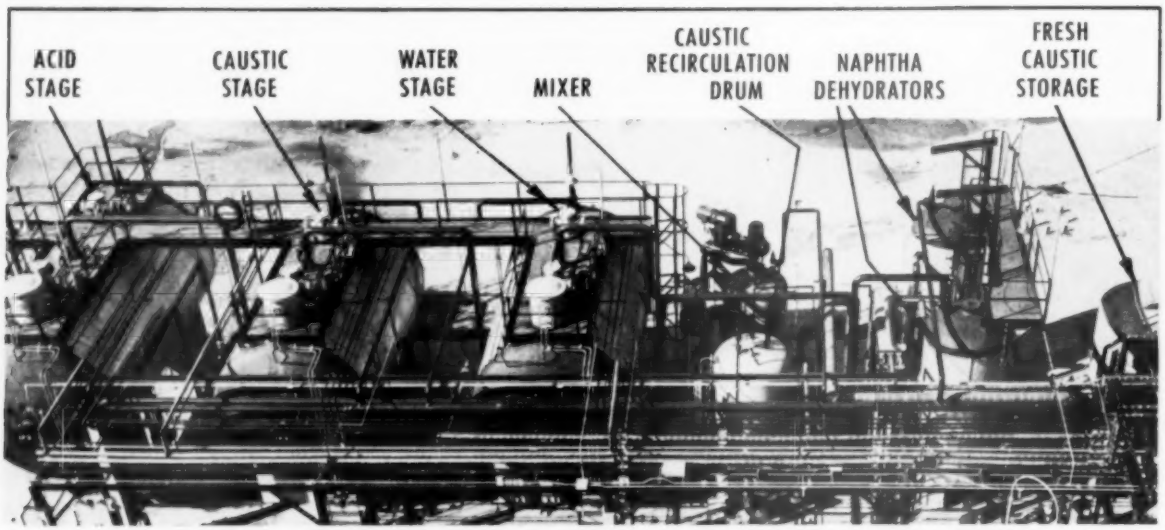


Electricity Speeds Sulfur Removal

The new 7,500 b/d catalytic reformer of Cities Service Oil Co., which went on stream about six months (PW—Nov.28'58,p28) ago, has a unique feature: Its feedstock is treated in the first electrostatic desulfurizer ever built.

Feedstock for catalytic reforming consists of straightrun naphthas of low octane value, with only about 5% of aromatics. The sulfur content of this stock varies from less than 100 parts per million up to 500 ppm. Such a high quantity of sulfur would poison the platinum catalyst in the reformer.

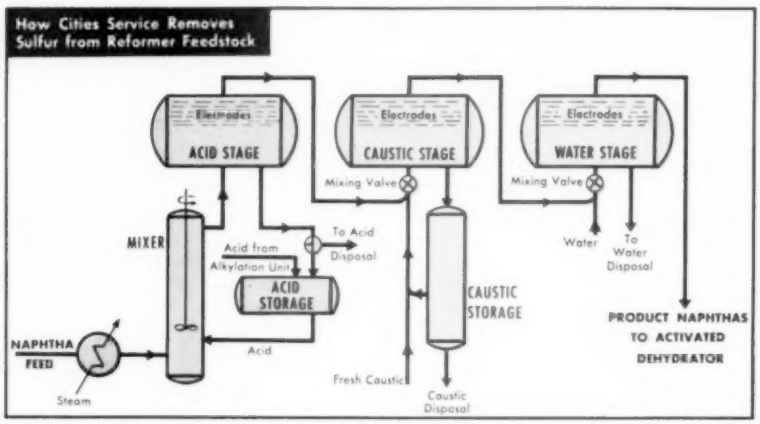
The electrostatic desulfurizer reduces the sulfur content to less than one-tenth of its original value, which is acceptable to the catalyst.

This desulfurizer differs from conventional processes in several points. First, it uses as oxidant spent sulfuric acid coming from an alkylation unit in the same refinery. Second, it accelerates reactions and separations, in its successive stages, by electrostatic energy, with a considerable saving of time.

The unit was described this week by R. J. Phillips and H. G. Napier, of Howe-Baker Engineers, Inc., Tyler, Tex., at the API Refining Division meeting, in New York.

The process (diagram, above) consists essentially of a succession of three stages, one for the actual desulfurizing reaction, one where the acid carried over from the first stage is neutralized with caustic, and finally a water-washing stage.

Before entering the electrostatic reaction vessel, the raw feed is thoroughly combined with the acid in a mixer. As the desulfurization takes place, electric current, passing through specially designed and properly oriented electrodes in the reactor, causes the suspended acid sludge particles to coalesce and settle to the bottom.



Operating pressure in this first stage is about 60 psi. to avoid formation of objectionable polymers. The temperature is kept low, at about 80F to 100F, to prevent formation of esters, and other losses.

The acid used for the reaction comes from the bottom of the alkylation unit, and ordinarily goes through the process once only. Fresh acid is kept on hand in case no alkylation acid is available. But fresh acid does not give any better desulfurization efficiency.

When the stock leaves the first stage, it contains up to 100 ppm. of acid. This acid is neutralized in the second stage, with a stream of dilute (12-degree Baume) sodium hydroxide. Electrostatic settling of the caustic sludge is performed as in the acid stage.

The average consumption of caustic is reported to be about 0.25 lb. per bbl. of naphtha treated. This is considered a little high, and is probably caused by certain side reactions due to the use of spent alkylation acid.

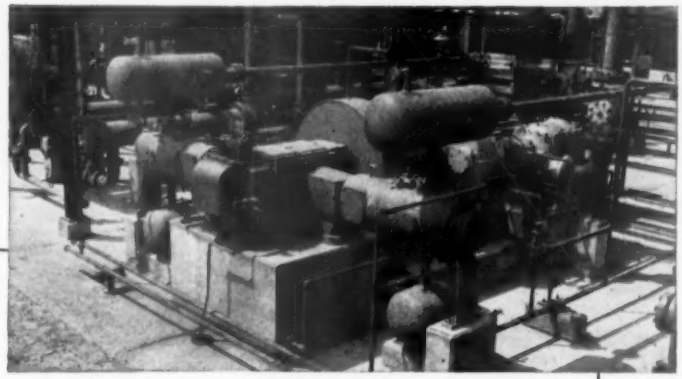
Following the third, or simple water-washing stage, also with electrostatic precipitation, the desulfurized, deacidified, washed naphtha passes through a dehydrator, where it is dried with activated alumina.

In addition to removing sulfur from the feedstock, the process is said to

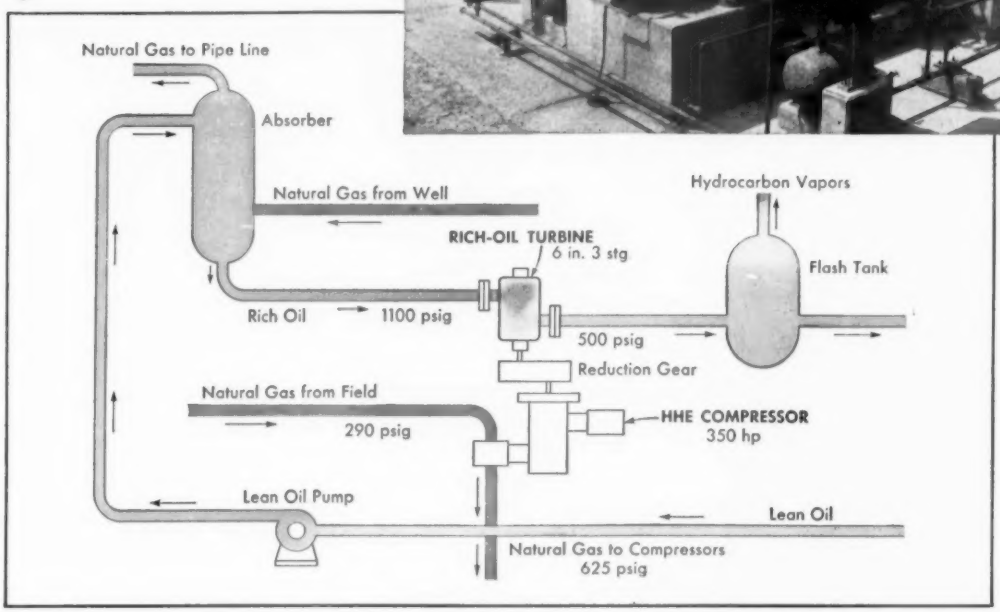
PUTTING "WASTE HORSEPOWER" TO WORK

By driving Ingersoll-Rand Compressors with I-R Rich-Oil Turbines, La Gloria Oil & Gas Company recovers 1000 hp

One of three Ingersoll-Rand HHE compressors driven by a 350-hp I-R 6-inch, 3-stage rich-oil turbine (shown at right) at the La Gloria natural gasoline plant.



Schematic flow diagram of the absorption cycle, simplified to show only one flashing stage. In this plant, three 350-hp turbines are installed between absorbers and high-pressure flash tanks, and two I-R 4-inch, 2-stage 150-hp turbines are located between high-pressure and low-pressure flash tanks.



IN the absorption process for natural gasoline extraction, rich oil from the absorber must be reduced in pressure before going to the still. This pressure reduction is usually accomplished by a reducing valve that does no useful work. But by putting an I-R *rich-oil turbine* in place of the reducing valve, other equipment can be driven by the horsepower recovered in the pressure reduction process.

This "free" energy recovery is well illustrated at La Gloria Oil & Gas Company's plant near Corpus Christi, Texas. Here, three Ingersoll-Rand gas compressors are driven by I-R three-stage rich-oil turbines each of which is designed to recover 350 hp from its rich oil stream. As shown in the schematic diagram above, the compressors boost 290-psi gas from the absorber to 625 psi for further compression. The rich-oil turbine reduces pressure from 1100 psi to 500 psi, operating at 3350 rpm and driving the compressor through reduction gears.

Does *your* process plant have idle fluid horsepower that could be put to work? Your I-R representative will be glad to give you complete information on rich-oil turbines, compressors and pumps for any application.

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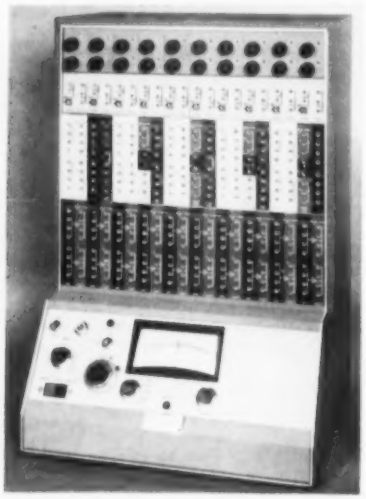
reduce substantially its lead and arsenic content, from 13 and 12 parts per billion, respectively, down to 3 and 5 ppb. It also reduces to a satisfactory level any nitrogen compounds that may be found in the raw feed.

A slight increase in sodium content of the treated naphtha has been noticed, due to some carry-over from the caustic stage. Intensified water-washing is expected to correct this condition. The cost of the unit at East Chicago was about $350,000.

Operation costs are said to be nominal. Only one operator is necessary per shift. Maintenance expenses have been in line with what would be expected for a new process, says Cities Service.

Howe-Baker estimates that the cost of desulfurization by this electrostatic process, per barrel of naphtha treated, varies from 4.8¢ when spent alkylation acid is available to 7.9¢ when fresh acid is used exclusively.

Although this new process has so far been used commercially only for the desulfurization of naphthas, Howe-Baker says that it promises to open an interesting field in the refining industry: Electrostatic mixing, the company believes, could be applied to such stocks as visbreaker gasolines, kerosines, and distillates.



Desk-Size Computer

A low-cost analog computer which occupies hardly more desk space than an electric typewriter, is now capable of performing 95% of the mathematical work encountered in process design calculations. Its manufacturer, Electronics Associates, Inc., of Long Branch, N.J., indicates that its construction was made possible by the development of a new transistorized DC amplifier.

New Way to Purify Gas

A new method for separating acid gases, such as carbon dioxide and hydrogen sulfide, from gas mixtures is said to be faster, more selective, and cheaper than conventional methods. It is known as the Giammarco-Vetrocoke process.

Many methods are currently employed for the separation of CO_2 or H_2S from natural gas, synthesis gas, or hydrocarbon mixtures obtained in a refinery operation.

Among these methods, the most popular for CO_2 extraction is the absorption by ethanolamine or by hot potassium carbonate. For H_2S extraction, mono- or diethanolamine, tripotassium phosphate, or a liquid oxidation-type process are well-known.

The disadvantage of most of these methods is that they are not selective. For example, CO_2 and H_2S are absorbed simultaneously by the amine compounds. Also, the rate of absorption and desorption is slow.

Activators to speed up the reaction have been studied on laboratory scale, but have not been used commercially.

The new Vetrocoke process uses arsenic, tellurium, and selenium compounds as activators.

The process has been applied on a commercial scale in Italy, Germany, France, and Japan. Reliable sources indicate that a 180-million cf/d Vetrocoke installation is being built currently for LPG processing at Fort Stockton, Texas, by Brown & Root Co.

Fluor Corp., Ltd., of Los Angeles, has been licensed to design and erect gas-treating plants using the Giammarco-Vetrocoke process in the U.S.

For removal of CO_2, the process utilizes a hot carbonate solution activated by arsenic trioxide (or selenous or tellurous acid) in an absorber.

The gas, devoid of its CO_2 content, leaves the absorber at the top, while the solution containing the CO_2, flows out from the bottom. It goes first to a flash drum, where a large amount of CO_2 is released, then to a steam stripper, where the balance of the CO_2 is removed. The regenerated solution then returns to the absorber.

A synthesis gas containing 34.3% of CO_2 by volume, treated by the conventional hot potassium carbonate process, still contains 2% of CO_2 at the outlet, while the new Vetrocoke process brings the CO_2 down to 0.5%.

The amine process is much more efficient: It brings the CO_2 content down to 10-25 parts per million. But it needs three times as much steam as the Vetrocoke process, according to Fluor. If a concentration of CO_2 as low as 10 ppm. is desired—for ammonia synthesis, for example—a final, and inexpensive cleanup can be accomplished in a small amine installation, following the Vetrocoke equipment.

A further advantage of the Vetrocoke process, Fluor says, is that the solution it uses is not corrosive; in fact, trivalent arsenic is an effective corrosion inhibitor.

For the removal of H_2S, the Vetrocoke solution contains a mixture of alkaline arsenites and arsenates.

Selectivity in the absorption of the H_2S, when CO_2 and H_2S gases are present together, is easily obtained by properly proportioning the arsenite and the arsenate, and controlling the acidity of the solution.

The sulfur-rich solution from the

How Costs of Vetrocoke Process Stack Up

	Vetrocoke with air regeneration	Vetrocoke with steam regeneration	Hot potassium carbonate process	Aqueous MEA process
Plant investment	$1,980,000	$1,570,000	$2,520,000	$2,900,000
Annual cost of:				
Steam (55¢/1,000 lb.)	116,000	513,000	1,050,000	1,480,000
Other utilities, including gas & chemical losses	210,000	190,000	365,000	376,000
Operating labor & maintenance	266,000	244,000	290,000	271,000
Depreciation, taxes, insurance	248,000	196,000	315,000	362,000
Total annual operating cost	**840,000**	**1,143,000**	**2,020,000**	**2,489,000**
Profit before taxes (25% of investment)	495,000	392,000	630,000	720,000
Total annual cost	**1,335,000**	**1,535,000**	**2,650,000**	**3,209,000**
Cost per 1,000 cu. ft. of gas	**4.1¢**	**4.8¢**	**8.2¢**	**10.1¢**

Data: Fluor Corp., Ltd.

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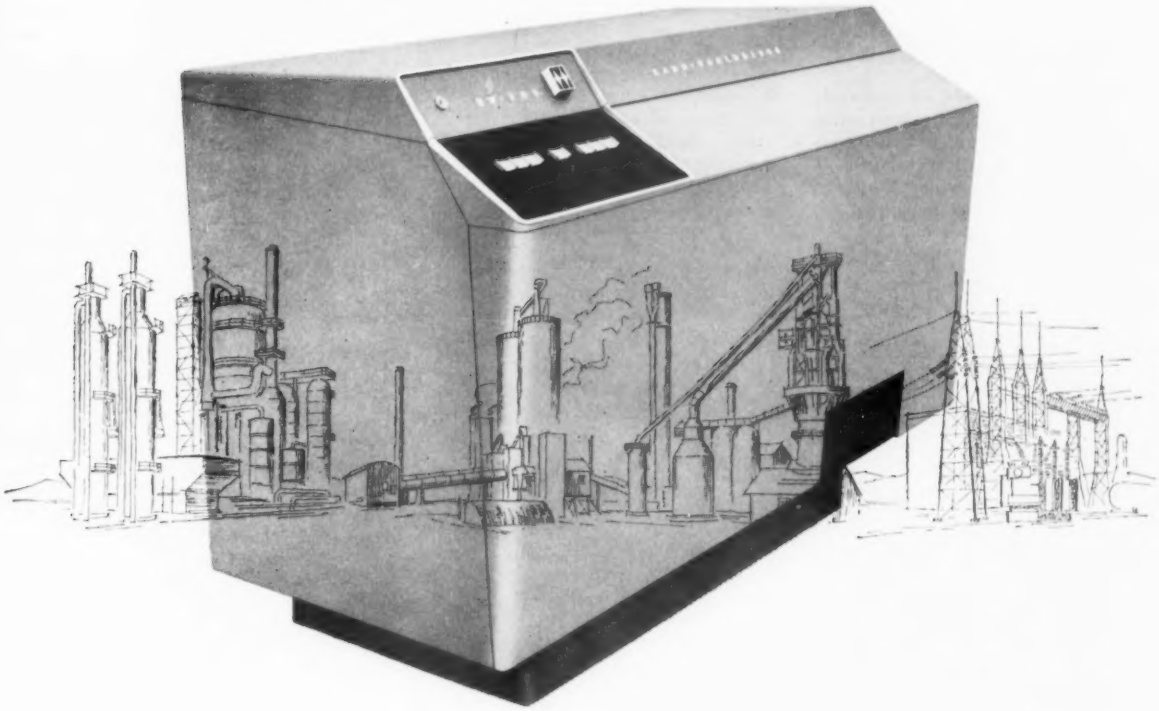

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absorber is regenerated by a flow of CO_2 in an "acidification" vessel, and the sulfur is removed by filtration from the residual slurry.

When CO_2 is to be extracted for further processing from a mixture containing both H_2S and CO_2, a two-step treatment is used, the H_2S being removed first. An extremely pure stream of CO_2 is obtained, because of the total absence of H_2S in the gas entering the second step.

A comparison of the total yearly cost of operation between the Giammarco-Vetrocoke process and two conventional methods of acid gas separation (table, page 64) shows savings of up to 6¢ per Mcf. of gas treated, according to Fluor. The figures are based on treatment of 90 million cu. ft. per day of natural gas containing 28% of CO_2 and 2 grains per 100 cu. ft. of H_2S, at a pressure of 1,000 psi. and a temperature of 100F.

Atlantic Dedicates New Wax Plant

One of the largest paraffin wax manufacturing plants in the world was inaugurated last week at Atlantic Refining Co.'s Philadelphia refinery.

Built in 14 months at a cost of $18-million by Badger Mfg. Co., Cambridge, Mass., the plant uses the Texaco-licensed methyl-ethyl-ketone solvent dewaxing process. Its charge capacity ranges from 8,000 b/d to 15,000 b/d, depending on the type of distillate being run. Output capacity is nearly 300 tons per day.

Propane is used as chilling agent in a battery of scraper exchanges and chillers, where the wax is crystallized out. The mixture is then fed to a system of rotary vacuum filters, where the liquid is drawn through canvas-covered drums, and the wax slurry is retained on the canvas.

The wax on the drum is then washed with additional solvent, and continuously removed. The wax slurry goes through repulping and refractionating operations for further removal of oil and any other undesirable components still remaining.

Finally, the wax is subjected to acid treatment and filtering through beds of diatomaceous clay to produce a fully refined wax.

A self-contained, air-conditioned, completely automatic molding and packaging plant can form up to 15,000 lb. of wax slabs an hour. Nearly 50% of the wax produced, however, is shipped to the trade in liquid form.

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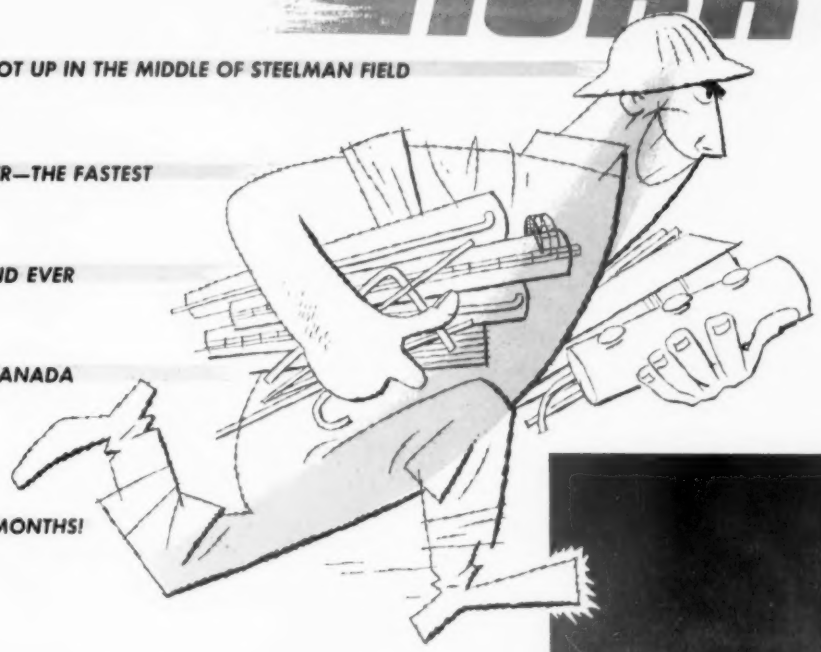
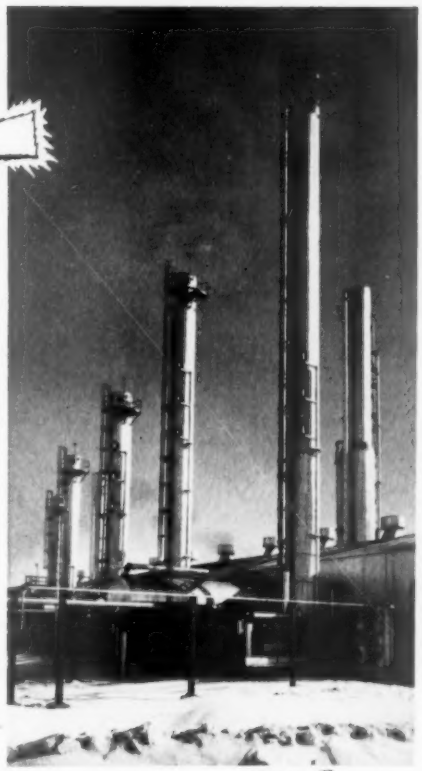
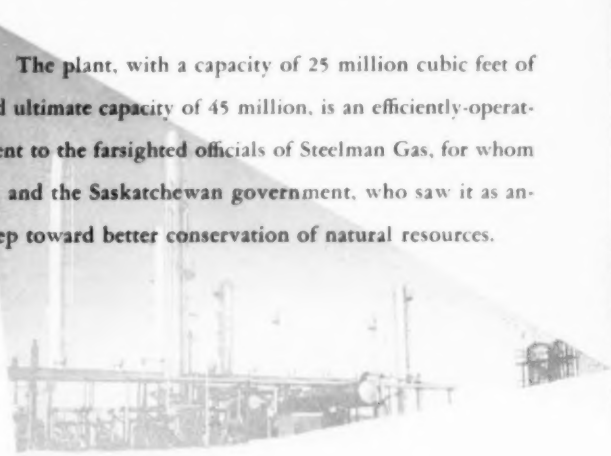


In public speeches, Treco was commended by both the Saskatchewan minister of resources and the president of Steelman Gas Limited, not only for its speed, but for its quality workmanship as well.

The plant, with a capacity of 25 million cubic feet of gas daily and ultimate capacity of 45 million, is an efficiently-operating monument to the farsighted officials of Steelman Gas, for whom it was built, and the Saskatchewan government, who saw it as another big step toward better conservation of natural resources.





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What's New
IN PROCESSING

A plant to manufacture oil carbon black will be constructed in the Union of South Africa. Phillips Petroleum Co. and Industrial Development Corp. of South Africa, Ltd., are forming an equally owned company—Phillips Carbon Black Co. Pty., Ltd.—to build and operate the plant. Its exact site has not yet been disclosed.

The plant, which is scheduled to be in operation within two years, will have an initial design capacity of 22-million lb. per year of oil blacks. Engineering and design work is now under way.

•

U.S. Oil & Refining Co.'s new million-dollar asphalt plant at Tacoma, Wash., is now on stream. Paving and liquid asphalt will be manufactured at the Tacoma installation, using domestic asphaltic crude brought to the site by tanker. The new plant marks the company's first major refinery expansion.

•

Scientific Design Co., Inc., New York, has acquired a ten-year license to apply the technology developed by Maruzen Oil Co., of Japan, in the manufacture of alcohol ketone.

Maruzen has operated since March, 1957, a plant producing about 550 tons of methyl-ethyl-ketone, with an efficiency of 82%.

It will receive from Scientific Design an initial payment of $10,000 plus a royalty on the ketone manufactured "the Maruzen way."

•

Texaco Inc. will add two new processing units to its 60,000 b/d refinery at Wilmington, Calif. Construction on the new units, a 12,000 b/d catalytic reformer and a 12,000 b/d hydrotreater, is slated to begin next month. The new installations will supplement similar units already in operation at the plant.

•

All of the capital stock of Cotton Valley Solvents, Inc. has been acquired by Triangle Refineries, Inc., of Houston, a wholly-owned subsidiary of Kerr-McGee Oil Industries, Inc.

The 2,000 b/d refinery at Cotton Valley, near Shreveport, La., produces aliphatic naphthas. The new plant will enable Kerr-McGee to reach mar-

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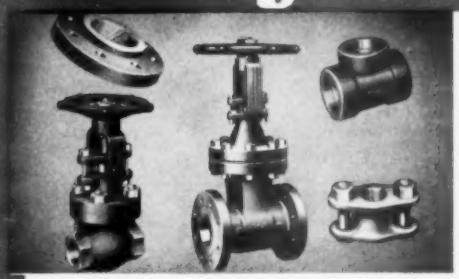

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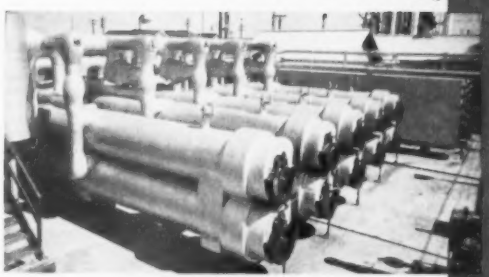

PROCESS EQUIPMENT FOR EVERY SERVICE

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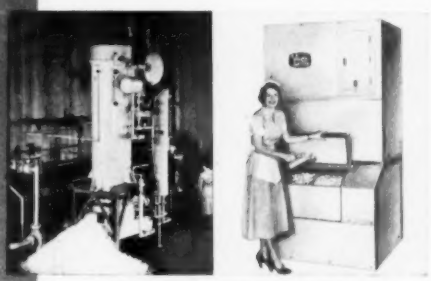

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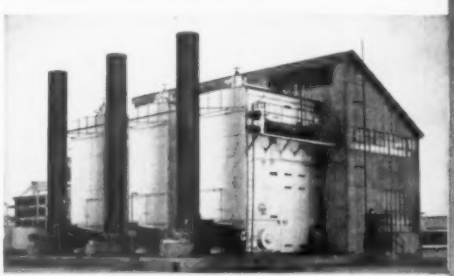

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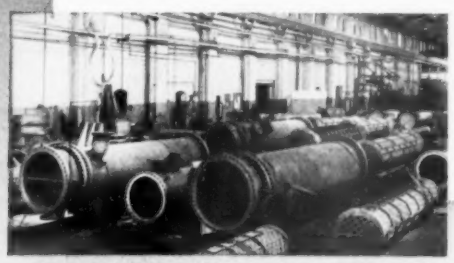

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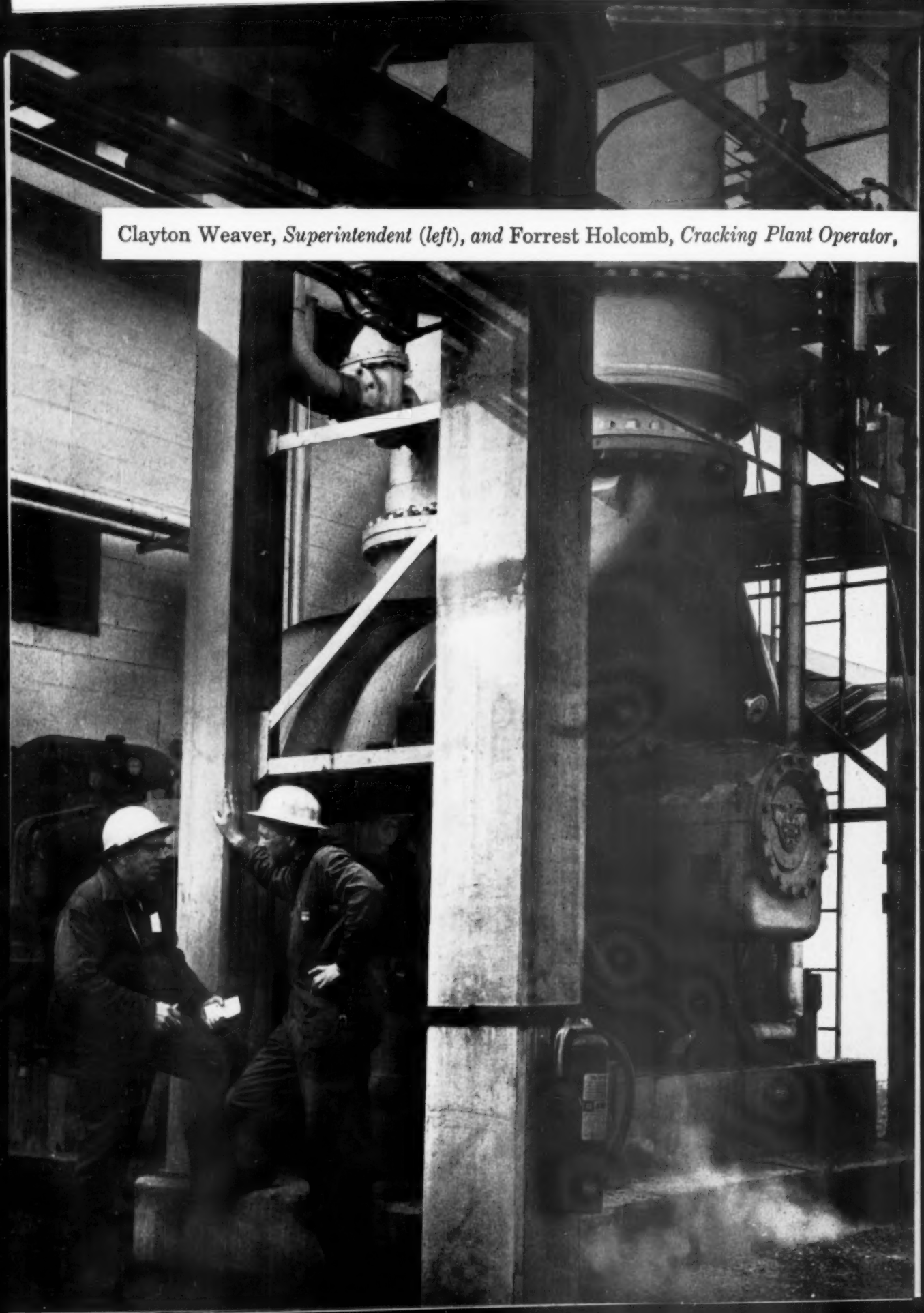

Clayton Weaver, *Superintendent (left), and* Forrest Holcomb, *Cracking Plant Operator,*

Leonard Refineries, discuss function of air supply in catalytic cracking and...

How Cooper-Bessemer centrifugal compressor supplies big-volume air 'round-the-clock

As "Doc" Weaver, Superintendent of Leonard Refineries, Inc., Alma, Michigan explains . . ."Big centrifugals are the answer, of course, where modern processing calls for an extremely dependable air or gas supply at high volume and relatively low pressure. For example, our catalytic cracking requires this kind of air supply for burning coke off the catalyst. Our Cooper-Bessemer Type RS Centrifugal Compressor delivers 31,500 cfm at 30 psi discharge pressure. And, it produces this flow on a continuous, 24-hour basis. We are mighty pleased with its reliable performance."

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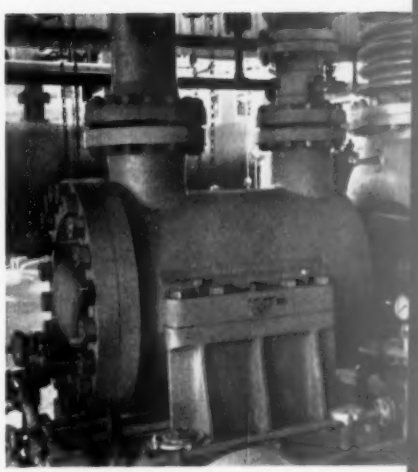

Cooper-Bessemer Centrifugal Compressors are available in multi-stage type for volumes up to 100,000 cfm . . . in barrel type for air or gas supply at pressures up to 5000 psi. Also in pipeline boosters in ratings up to 20,000 bhp. Shown above: Cooper-Bessemer barrel type centrifugal compressor.

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kets previously inaccessible to its Cleveland (Okla.) refinery.

•

Canadian Bechtel, Ltd., has just been awarded a contract for the construction of a $2.2-million alkylate plant at Imperial Oil's Edmonton refinery.

The new plant is expected to produce 1,500 b/d of alkylate. It will also feature a 10,000-bbl. sphere for the storage of liquefied gases.

Construction will get under way in August, with completion scheduled for some time in early 1960.

•

California Research Corp. has contracted with the U.S. Atomic Energy Commission for the development of petroleum-based coolants for atomic reactors.

Presently, reactor cooling is done with water, but research has shown that the organic coolants, such as polyphenyls, are potentially superior. They do not corrode metal, are not subject to induced radioactivity, and do not react with uranium.

Plastic Bubble Caps

Bubble caps and risers made of thermosetting plastic, which meet the corrosion-resistance requirements of the oil and chemical processing industries, are being offered by Wyatt's Plastics, Inc., Houston, after three years of research and field testing. One test involved ten months' service in a tower contacting 65% sulfuric acid at 340 F. Trays, downcomers, and other equipment made of the plastic will be offered soon.

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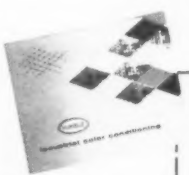

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Steel Strike—How Much Would It Hurt?

The big surge in steel buying in recent weeks is a pretty good indication of just how seriously some industries are taking the possibility of a steel strike.

The prospect that steelworkers will strike when contracts run out in June brings with it the threat of steel shortages during the shutdown—and the likelihood of increased steel prices afterward. And because memories of the 1957-58 recession are still fresh, a lot of people are worried about what will happen to the general business picture when steel ordering eases later in the year.

But a close look at current trends in steel inventories, and at the experience during the last steel strike, indicates that these fears may be exaggerated.

* * * *

First of all, unless there's a very long strike, steel users probably won't be hurt much by shortages. Inventories of steel built up in recent weeks (though not so large as they were before the 1956 strike) will go a long way toward forestalling any scarcities that might come as a result of a strike this year. And the weeks remaining before contracts run out will permit steel users to stockpile even more of the metal.

Producers of oil country goods and line pipe feel that most of their customers will be able to get through a four- to six-week strike without running into serious shortages. A few oil companies have already built stocks of these items large enough to see them through the third quarter of the year.

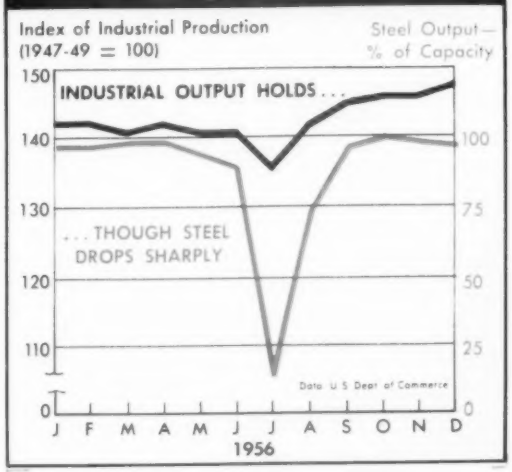
But how well steel users come through a strike depends also on how fast they use up the steel they are now buying. Shipments of oil country goods, for example, are actually below levels of 1956, when a steel strike did cause shortages. But because drilling operations are off, supplies of those goods are not being used as rapidly this year. If, however, oil companies step up their activity in future weeks, a long strike could pinch their inventories of steel. And other users of steel might face similar problems if they begin to draw on their supplies more heavily.

* * * *

Because the buildup of steel inventories has been sparking the rising level of business activity in recent weeks, there is some fear of what will happen to business in general if steel buying eases following the strike. A look at the situation in 1956 should put to rest any fear that a lull in business activity will follow a strike.

That year, the strike began on July 1, and lasted for 36 days. Steel mills had been operating at well

Industrial Output and a Steel Strike



over 90% of capacity for months before the strike deadline, and the index of industrial production (1947-49 = 100) stayed up over 140 during the first half of 1956.

The index fell to 136 for the month of the strike. But by the end of September, industrial output had passed earlier highs. The index hit an all-time peak of 146 before the year ended—and the boom spilled over into 1957.

There is good reason to believe that this expansion pattern will be repeated this year. Steel stocks now being built should be used up by the end of the summer, and the expected continued upturn in auto-buying and capital spending are sure to cause renewed heavy demand for steel next fall.

* * * *

The remaining question mark, of course, is what will happen to steel prices after new wage contracts are signed. A hike in prices has usually followed contract concessions to the steelworkers. In 1956, steel companies boosted wholesale prices of finished steel by about $8.40 a ton—roughly 7%—after the strike.

However, public concern about inflation, and the steel industry's fear of growing foreign competition, may put the halter on both wage and price increases this year. Also, present profit margins may permit steel companies to absorb a bigger share of the wage rise this time. Thus, any price increases will probably be not more than half as much as those that followed the 1956 strike.

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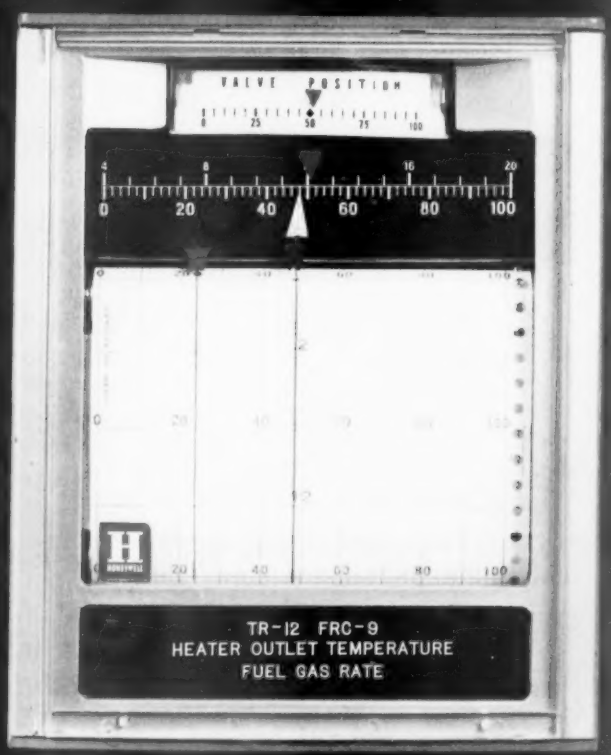

No line power connections in the field. The *ElectriK Tel-O-Set* system requires no external power at any field-mounted device and uses only two wires between it and the control room. These two wires form a series circuit that carries the measurement or control signal as well as the system's power. The only line power connection is made at the receiver.

Two-wire transmission sharply reduces installation costs. Add this to the fact that the *ElectriK Tel-O-Set* system's d-c transmission eliminates the need for shielding the wires, and you have the simplest, most economical installation possible.

*Trade name, Minneapolis-Honeywell Regulator Company

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. . . newest advance in industrial process control

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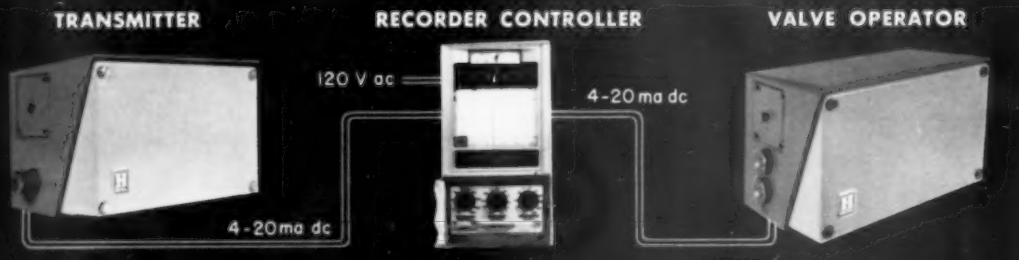
Control *any* industrial process with the *ElectriK Tel-O-Set* system. It has been designed as a complete system, rather than as a collection of individual instruments. The line consists of 22 major units which permit local and centralized data presentation, adjustable cascade control, ratio control and many other auxiliary functions. *ElectriK Tel-O-Set* transducers make the line completely compatible with your present pneumatic instruments.

. . . built for industry

Die-cast aluminum cases and stainless steel components are used throughout the line to withstand the rough handling and demanding environments of industrial applications. Standardized components, together with extensive use of quick-connect and plug-in design, mean ready interchangeability of parts, reduced spare parts inventory, easy maintenance. The modular, or "building block" concept is employed throughout for maximum flexibility.

. . . this is how it works

The basic *ElectriK Tel-O-Set* system consists of a transmitter, receiver, controller and final control element. The transmitter measures any process variable, translates it into a standard 4 to 20 milliampere direct current signal, and transmits to the receiver through a pair of copper wires. The receiver indicates or records the signal in terms of the actual value of the process variable, compares it with a pre-determined set-point, and sends the difference to the controller as an error signal. The controller then converts this into a corrective 4-20 milliampere output to operate the control valve—again transmitting over a single pair of copper wires.



All process and external electric connections to *ElectriK Tel-O-Set* field-mounted transmitters are entirely isolated from inside the case . . . to permit installation without the need for instrument department supervision.

All receivers, from single-point indicator without control to two-pen ratio-cascade control station, are housed in the same case and all use the same panel cutout of 5½ x 6 inches. Controllers can be mounted with adjustments in front or back of panel.

All *ElectriK Tel-O-Set* field-mounted units . . . whether transmitter, transducer, or valve actuator . . . operate at ambient temperatures of —40 to 150° F. They all work on the same force-balance principle and use many similar components.

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INDICATORS
One pointer, with or without control
Milliammeter, with or without manual loading

CONTROLLERS
Two mode and three mode

FINAL CONTROL ELEMENTS
Current to pressure (I/P) valve operator
Electro-pneumatic positioner
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TRANSDUCERS
P/I: 3-15 psi to 4-20 ma dc
I/P: 4-20 ma to 3-15 psi
I/F: 4-20 ma dc to frequency
F/I: frequency to 4-20 ma dc

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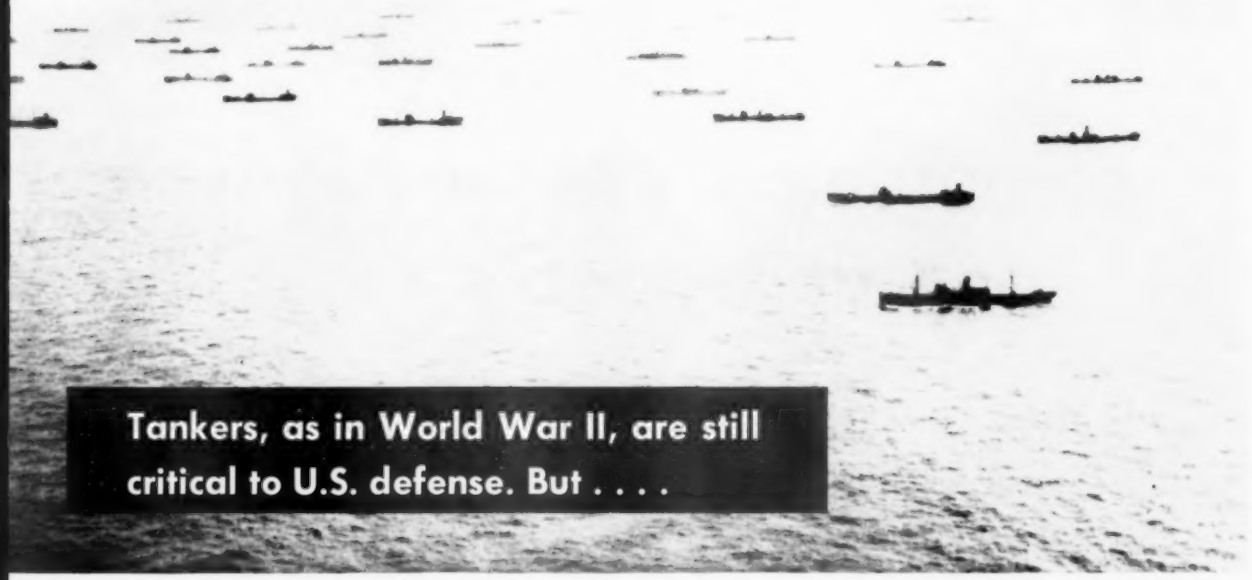

Tankers, as in World War II, are still critical to U.S. defense. But . . . .

Will We Have Enough Tankers for War?

We will not, maritime experts now say, unless there is a decided shift in national defense policy.

There's growing apprehension in marine circles that tankers are being shortchanged in current national defense strategy.

Maritime officials are now beginning to say publicly what some tanker men have been saying privately for the past several months.

This week, Ralph E. Casey, president of the American Merchant Marine Institute, hit out at Washingon thinking that no merchant marine will be needed in any future war.

Casey said that, although token attention is given by "those responsible in Washington" to requests for a stronger merchant marine, the nation's over-all defense program, at this point, has all but turned its back on merchant ships.

"Make no mistake about this," Casey said, "there is considerable thinking behind the scenes in Washington that in a future war a merchant marine will be useless."

If tankers are to get a more important defense role, someone will have to shake the commonly held view that the next war, if it comes, must be a short-duration, atomic-weapons conflict.

Maritime observers pushing for renewed emphasis on tankers for national defense do not advocate cuts in research and development for nuclear age weaponry. But they do point out that U. S. and Russian expenditures along this line have created a balance of power, a mutual deterent to use of such weapons.

They agree that many dollars must be spent so that we will continue at least to match the Russians in this field, and maintain the deterrent.

But at the same time, they contend that as long as this standoff of atomic weapons exists, the danger of another kind of war—one with "conventional" weapons—increases.

And they say that in such a war, adequate merchant shipping is critical.

Casey put it this way: "There is no denying such a possibility [of an atomic war]. The real danger, as I see it, is that our defense mechanism may be geared solely for all-out war, whereas eventually we could be confronted with a conflict or conflicts in which sea power would play as important a part as it has in the past."

To help support their contention that a prolonged conflict is now far more likely, maritime sources point to Russia's current emphasis on building submarines.

"Is Russia falling into this same trap?" Casey asked this week. "I believe not.

"We have heard talk of a fleet of 500 to 600 submarines. Do you think they need these for missile launching only? No! The fact is, they realize, as in the past, that control of the seas is absolutely essential to victory.

"And I hate to think of what 500 or 600 subs would do to our present inadequate fleet of merchant ships."

The U. S., according to this position, does not have adequate tanker tonnage to meet its wartime needs, and should act—but fast—to make sure that it will.

On this score, Vice-Adm. Ralph E. Wilson, U. S. Navy Deputy Chief of Operations (logistics), recently provided some ammunition.

Said Wilson, "Six years ago we possessed a marginal, but gradually deteriorating, capability to carry out the transportation task [of wartime operations]. Since then, the Dept. of Defense has observed with concern the slow rate of progress made in the replacement of aging vessels.

"Greater emphasis must be placed on the need for orderly shipbuilding programs."

Wilson summarized the problem this way:

"The present rate of new shipbuilding will not offset the rapidly approaching block obsolescence of the vast proportion of U. S.-controlled merchant-type tonnage, both active and reserve . . .

"Crash building programs in war-

FR 2800a 471M

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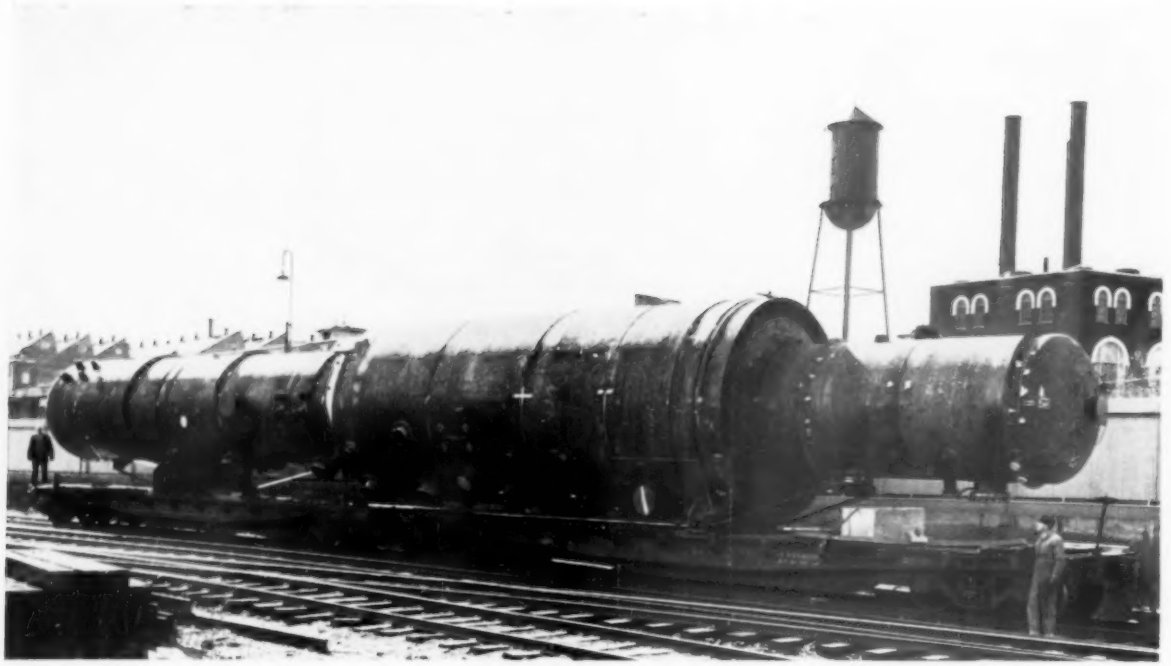

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time can only be avoided by maintaining a modern and adequate maritime posture in peacetime."

The obvious question that arises is: What about all the tankers now in layup?

The Military Sea Transportation Service, which is charged with the responsibility of seeing to it that all military petroleum needs abroad are taken care of, recently answered the question.

An MSTS report said that the service could fill all such military petroleum needs in the event of national emergency by using every available U. S.-controlled tanker in existence, but that such tankers would barely be enough.

MSTS strongly implied that its use of every available tanker would leave great gaps in U.S. coastwise shipments of oil.

Those convinced that this country needs more tankers for defense feel that policy changes will come only after a good deal of give-and-take discussion on the over-all U. S. defense posture.

Casey virtually threw out a challenge for such discussion:

"I have mentioned the influence in Washington of those who already have written off a merchant fleet as a defense facility. I know these views exist, and I think it is high time for them to be brought out into the open.

"I think this concept [of the all-out war] is wrong as it can be. But right or wrong, let it be brought out in the open and discussed on the merits. There must be an end to the kind of maneuver that has been going on now for several years, where the axe is applied to essential funds before they ever reach Capitol Hill.

"That kind of fight you can never win."

After that, the most immediate physical problem seems to be to see to it that U.S.-owned tankers flying flags of friendly nations—so-called "flags of convenience" are kept within effective U.S. control (PW—Jan.30'59,p13). Adm. Wilson outlines the "flags" problem in these terms:

"Over the past few months, increasing pressure has been exerted against 'flags of convenience' by foreign shipping interests, maritime labor organizations, and Western European governments.

"Combined opposition from these sources threaten to make it economically impracticable for American owners to operate their ships under 'flags of convenience.' This raises the immediate question as to what steps should be taken to insure the continued availability of these ships for the purposes of national defense.

"It is important to note that over half of the U.S.-controlled tanker tonnage is registered under the flags of Panama, Liberia, and Honduras."

One step, U.S. tanker owners feel, would be a stiffened position by State Dept. officials on the matter when they meet with representatives of traditional powers on the "flags" and other maritime issues early next month.

But beyond this, it's felt that a sizable addition to the current tanker fleet should be encouraged by government action.

How sizable an addition? Estimates vary. But most seem to fall somewhere between 20-million and 30-million tons over and above current available tonnage.

The U.S. is said to have tanker tonnage approaching 15-million at its disposal now, with current construction expected to raise the figure by perhaps 5-million tons in a few years.

In 1956 the Flemming Report recommended government incentives for construction of 18-million tanker tons —300 ships of 60,000 tons—through the early 1960s.

The recommendations were never acted upon.

But what form the government incentives should take remains to be answered.

The Flemming report suggested that the fast-amortization provisions of the Defense Production Act be applied both to tankers and to shipyard facilities for building the tankers.

Another alternative, tanker men feel, would be a government-sponsored trade-out program.

Still another approach is government encouragement of large-scale private investment for large-capacity tankers for long-distance oil shipments. But the government abandoned this approach when it instituted voluntary imports controls back in 1957, stunting the growth of tanker tonnage which was then beginning.

Perhaps the least tasteful of all alternatives, from the taxpayers' point of view, would be straight appropriation for additional tanker tonnage. Such an appropriation would have to be in the range of billions of dollars.

If a tanker building program should come into being, new design features would be necessary.

Admiral Wilson suggests these:

- Speed—"Where national defense allowances are made, and the ships are certified as suitable for speedy and economical conversion into naval auxiliaries, tankers should be capable of a sustained speed of 20 knots or more."
- Other characteristics—"The recommended general characteristics of commercial tankers most suitable for military purposes are 25,000 to 38,000 deadweight tons."

What's New / IN TRANSPORTATION

Maritime interests are protesting their exclusion from the upcoming talks between the State Dept. and representatives of Western European nations on U. S. maritime policy.

The conferences, set for June 8-12, will deal with U. S. maritime subsidies, cargo preference, and the registry of many U. S.-owned vessels under flags of Panama, Liberia, and Honduras.

Ralph E. Casey, president of the American Merchant Marine Institute, contends that, "Unlike in the U. S., the shipping interests in Western European countries are in close and constant communication with their foreign ministries."

If the talks must take place, Casey feels, "the industry whose livelihood is at stake should be entitled to a place at the table."

Humble Pipe Line Co. has opened its short products pipeline system to Dallas's Love Field (PW—Oct.24'58, p36).

Two 4-in. lines will carry jet fuel and aviation gasoline from Humble's North Texas terminal at Irving to the airport 5½ mi. away.

The Irving terminal is connected by pipeline to Humble's Baytown refinery.

•

The Federal Power Commission last week authorized expansion of Chicago-area gas line facilities to handle gas to be received from the proposed Midwestern Gas Transmission Co. system.

FPC approved Chicago District Pipeline Co.'s plan to build 50 mi. of 36-in. pipe paralleling the com-

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pany's existing Joliet-Calumet (Ill.) lines to Chicago; a short lateral line; and new control and measurement facilities.

Chicago will take gas from the 350-mi. Midwestern system from Portland, Tenn. Midwestern, which recently received conditional FPC approval of its system (PW—May15 '59,p26), will take gas at Portland from its parent company, Tennessee Gas Transmission Co.

•

New tests show that natural gas lines operate more efficiently after internal cleaning and coating.

A 12-company cooperative test program recently studied the effect of internal cleaning and coating on a 12-mi. stretch of Tennessee Gas Pipeline Co.'s 24-in. line near Refugio, Tex.

Conclusions:

"Pipeline deliverability was increased by approximately 5% to 10%, depending on the rate of flow.

"This is broken down to a nearly constant 4% increase directly attributable to the cleaning operation . . . and an additional 1% to 6% directly attributable to phase three" (internal coating).

•

U.S. underground gas storage capacity has reached 2.7-trillion cu. ft., according to a recent American Gas Assn. report.

The report says that the industry increased its underground storage capacity by about 115-billion cu. ft. in 1958.

•

Service Pipe Line Co. is connecting its crude system to leases in the Barrett pool, Banner County, Neb.

The company is building 13 mi. of 6-in. line to connect to the area. Sterling Construction Co. is building the line for Service.

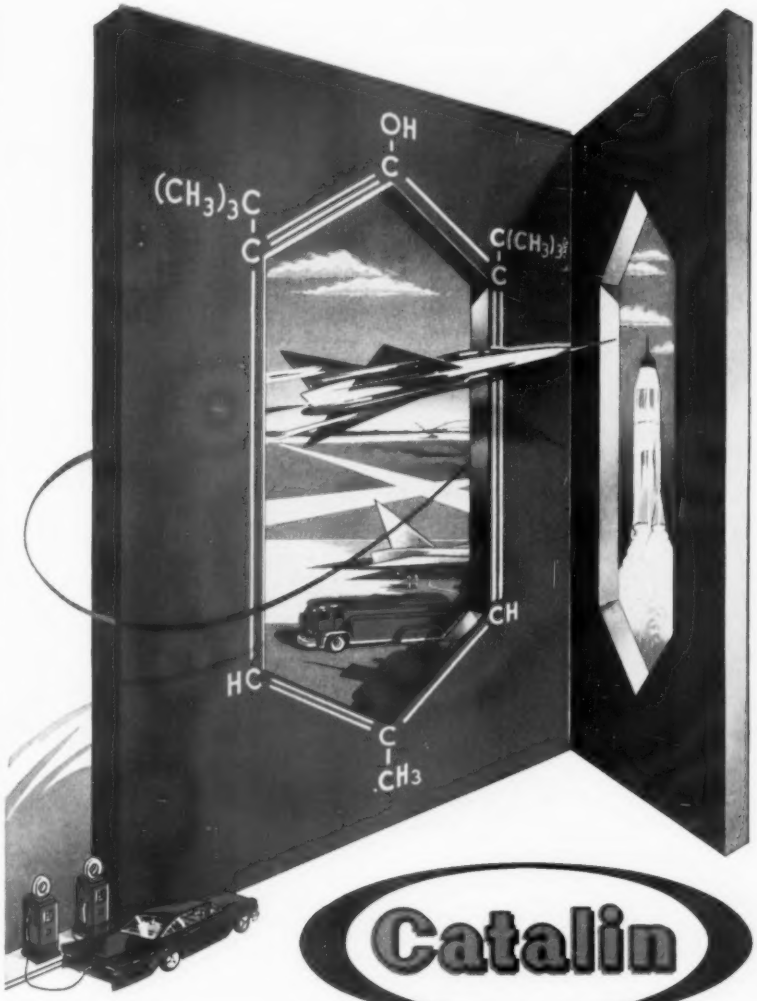
•

Shell Oil Co. has begun field work on a mined underground cavern for the storage of butane at its Wood River (Ill.) refinery.

Built in limestone formations more than 450 ft. underground, the cavern will measure 300 x 400 ft. All men and equipment will be lowered in and out of the cavern through a 42-in. opening.

Fenix & Scisson, Inc., Tulsa, is the contractor.

Up to 420,000 bbl. of butane will be stored in the cavern, which is scheduled for completion by mid-1960.



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*Typical Analysis

Sudan amends its new oil law as . . .

Shell, ENI Bid for Oil Rights

CAIRO—Several international oil companies—led by Shell and Italy's ENI—have applied for exploration licenses under Sudan's newly amended oil law.

Most of the companies, including West German and Egyptian firms, are said to be interested in the Red Sea area. Exploration licenses are expected to be issued by early June.

Both Shell and ENI have offered to set up refineries as well as undertake exploration. But ENI wants marketing rights, too.

ENI (Ente Nazionale Idrocarburi) has offered to search for oil in the Red Sea area, and build a 15,000 b/d refinery in Port Sudan. The plant's capacity is calibrated to the Sudan's estimated consumption in 1965. In return, ENI wants permission to set up marketing outlets in the country.

Shell made a counterproposal to set up a refinery and explore. The company already markets in the Sudan.

Although the offer to build the first refinery in the country is an attractive proposition, the Sudanese authorities are said to be keenest on exploration.

In the meantime, the country's new oil law has been amended on two points to make it more attractive to foreign oil companies, Mahmoud Abdallah, director of Sudan's Geological Survey told PETROLEUM WEEK in Cairo.

The original bill, the Petroleum Resources Development Act, went into effect earlier this year (PW—Feb.6 '59,p50).

Under the oil law, Abdallah, as director of the Geological Survey, is also chairman of the Sudan Petroleum Board, whose executive duties include granting of exploration licenses and development leases. He was also head of the Sudanese government delegation at the recent Cairo Oil Congress.

The amended version of the law calls for straight 50-50 profit-sharing with the government. An earlier provision for a boost in the government's share of 70% after ten years of development has been dropped.

Article 9/4 of the amended act reads as follows: "The lessee shall pay: (a) an annual rent, payable in advance of £60 [the Sudanese pound is worth $2.80] in respect of each square kilometer or part thereof; and (b) a royalty on petroleum produced, which shall be initially calculated at the rate of 15% of the wellhead value of all crude oil and natural gas produced; but so that the final royalty payable by the lessee for any one year shall be the equivalent of 50% of the net profits of the lessee for that year."

The provision in the original act under paragraph (b) of Article 9/4 said: "Provided that at any time after the expiration of 10 years from the commencement of the lease, the final royalty so payable may be increased by decision of the committee [the Ministerial Petroleum Committee constituted by the oil law] from the equivalent of 50% to a maximum not exceeding the equivalent of 70% of such net profits.

The government is thinking of some form of tax relief for lessees, Abdallah told PETROLEUM WEEK. Like the original version of the act, the amended oil law provides that all payments will be in royalties plus rentals, and makes no mention of income tax.

The amended oil law also gives companies holding exploration licenses the right to receive development leases upon discovery.

The original version of the act merely said: "A license confers on the licensee the following rights in the license area: (a) the exclusive right of exploration; and (b) the right upon discovery within the license area to apply for a lease in respect thereof."

The amended version has added "and receive" before "a lease."

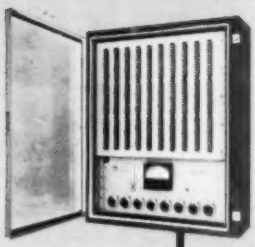
The amended act has also entirely deleted Article 10, which provided that, upon the granting of a lease, "a license shall merge in the lease, so far as it relates to any part of the license area not included in the lease area."

Tariki, Wahba Elected to Aramco Board

Last week, Arabian American Oil Co. officially elected Sheikh Abdullah Tariki (right), Saudi Arabia's Director-General of Petroleum Affairs, and Sheikh Hafiz Wahba (left), Saudi Arabia's Ambassador-at-large to the Arab world, to its board of directors (PW—May22'59, p34).

They were added in keeping with an agreement between the government and the company that Saudi Arabia should have representation on Aramco's board.

CM-2



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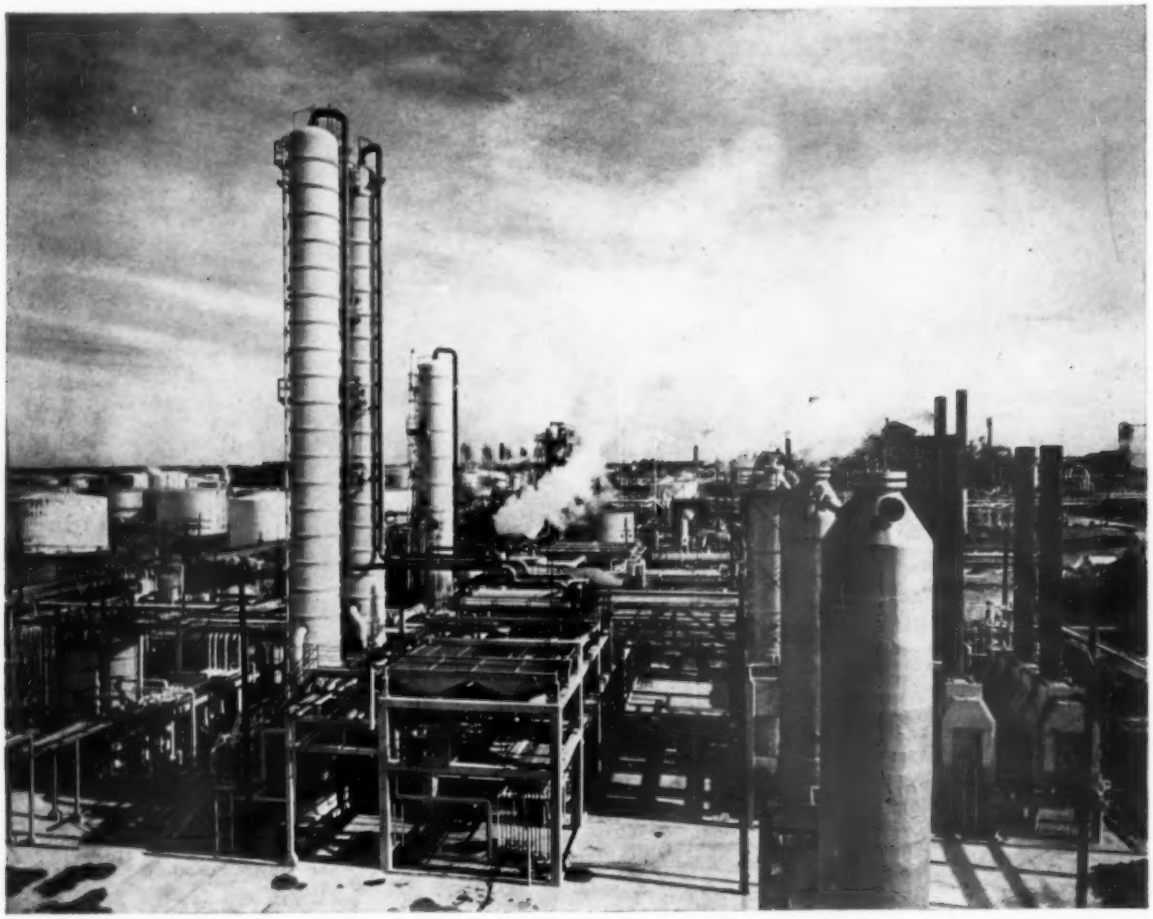

HYDROFINING REPLACES ACID TREATMENT

To eliminate pollution of air and effluent water, reduce operating costs, and to produce a sulphur free finished product, a large Gulf Coast refiner recently placed in operation the above pictured 6000 barrel per day HYDROFINING Unit designed to supplant acid treatment in processing close boiling range naphthas.

Feed stock is vaporized and mixed with hydrogen which catalytically reacts with sulphur contained in the feed stock mostly in the form of mercaptans, to form hydrogen sulphide which is further processed to recover elemental sulphur. After HYDROFINING the liquid product is washed with caustic and filtered through charcoal.

HUDSON furnished mechanical design, materials and equipment; and constructed the HYDROFINING Unit and the Fractionating Unit shown at the left of the picture.

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In Venezuela:

Gas Investments Will Rise

CARACAS—Venezuela's private oil industry will boost its investment in utilization of natural gas to $348-million by the end of 1962, according to Dr. Raimundo Molina, of Creole Petroleum's gas department.

In a talk at the Venezuelan College of Engineers, Molina said investment to date is $231-million, and that another $117-million will be spent in the next four years on gas utilization projects planned or under way.

Creole itself last week awarded a contract to Foster Wheeler Corp. for construction of the company's fourth gas conservation plant in Lake Maracaibo.

Bachaquero No. 1 will treat and reinject 145-million cf/d of gas at 2,500 psi. for gas conservation and for increased crude recovery from the reservoir. The plant is located about 4½ mi. offshore from Tia Juana. Centrifugal compressors will be powered by gas turbine engines.

The platform for the $28-million plant has already been built.

Creole has invested $125-million in gas utilization projects to date, and will spend another $17-million in the next four years. By the end of last year, the company was using 585-million cf/d, or 50% of its gas output; by the end of 1962 it expects to use 900-million cf/d, or 72% of gas produced.

Total gas production in Venezuela last year was 3-billion cf/d, of which 43% was used and 57% flared. Of the gas used, 68% was re-injected in reservoirs, 23% was burned as fuel by oil companies, and 9% was marketed locally.

Biggest problem in gas conservation and utilization in Venezuela is the fact that practically all gas is produced along with oil, Dr. Molina says. Hence, gas production is difficult to regulate.

Jersey Quitting Danish Oil Hunt

COPENHAGEN — Jersey Standard's Danish American Prospecting Co. is giving up its disappointing oil hunt in Denmark.

It recently abandoned its latest wildcat, the No. 1 Slagelse, at 9,777 ft. on the island of Zealand, west of the town of Slagelse.

In roughly 1½ years of exploration, the company has drilled 11 dry holes, abandoned at depths between 3,000 ft. and 10,000 ft. The company encountered no shows of oil or gas in any of the wildcats.

Danish American had been a subsidiary of Gulf Oil Corp. until it was purchased by Jersey (PW—Sep.20'57, p63). During its Gulf ownership, it drilled 17 unsuccessful tests.

Here's Where Jersey Drilled Its 11 Wildcats

Pemex Lists Its Finances in First Published Balance Sheet

Balance as of December 31, 1958

in millions of pesos (exchange rate: 12 pesos = $1)

ASSETS		
Cash and securities on hand		97.0
Accounts receivable (less reserve for bad debts)		165.6
Inventories, crude and products		506.8
Inventories, materials and supplies		970.5
Total current assets		1,742.0
Assets contributed by the government, cost	168.7	
less depreciation	154.7	14.0
Oil and gas wells (excl. value of reserve), cost	1,928.3	
less depreciation	1,027.2	901.1
Other assets, cost	6,269.0	
less depreciation	2,019.0	4,250.0
Deferred charges and miscellaneous		51.8
Total assets		6,959.0

LIABILITIES			
Short-term liabilities			1,392.3
Liabilities payable in kind			12.5
Long-term liabilities			1,919.7
Due to federal, state, and local governments			449.0
Deferred credits			0.3
Reserves:			
For exploration			981.3
For tanker fleet repairs			32.4
For insurance			93.4
For retirement, indemnities to personnel			336.7
For replacement of equipment, installations			1,220.5
Contingencies:			
Income, royalties, interest on net worth			179.2
Expropriation indemnities, total		1,606.7	
Less payments to date		1,172.2	
Balance due		434.5	
Less charges to future operating expenses		434.5	
Net worth and deficit:			
Net worth		556.6	
Less: Deficit to previous year	99.5		
Fiscal 1958 deficit	115.5	215.0	341.6
Total Liabilities and Net Worth			6,959.0

PETROLEOS MEXICANOS, Mexico's 21-year-old state oil agency, made its balance sheet public for the first time last week. The company admits to losing money for the past two years, and writes off the 434.5-million-peso balance due expropriated oil companies as charges to future operating expenses. At the bottom of the sheet, Pemex also lists 141.5-million pesos for "drilling by contract" and 26.5-million pesos for "other contingencies (liabilities)."

What's New / AROUND THE WORLD

ARGENTINA—YPF has postponed opening tenders on its unproved areas in north and central Argentina to give U.S. companies a chance to include dollar credits with their bids. Bids will now be opened Aug. 4 instead of July 2. Horacio A. Legarreta, YPF president, intends to give priority to companies including a $3-million to $5-million long-range credit—or more—with their offers, to help YPF finance its $1-billion investment and expansion program. More than 30 foreign oil companies have shown interest, according to a YPF spokesman.

•

ARGENTINA—Bids are slated to be asked this month on construction of a 1,055-mi., 350-million cf/d gas pipeline from the Comodoro Rivadavia field to Buenos Aires. Its cost is estimated at $230-million.

Ing. Esteban Perez, president of the National Gas Enterprise, says the new line is needed since Pan American Oil (Indiana Standard), the Carl M. Loeb, Rhoades group, and the state oil company, YPF, are expected to increase gas output tenfold at the field. A 35-million cf/d line already runs from the field to Buenos Aires.

•

ECUADOR—Davis Oil Co., Denver and New York, has acquired oil rights on an 11-million-acre concession from Universal Mineral Resources, Inc. The concession lies along the coast in the west-central region. Universal retains mining rights.

•

SWITZERLAND—A Swiss group is looking into the possibility of bringing Lacq gas from France into Switzerland—when a pipeline now under construction reaches Dole, near the Swiss border, later this year. The group, headed by Electro-Watt, a Swiss electric company.

•

VENEZUELA—A new Sinclair discovery may have extended Eastern Venezuela's Aguasay field 8 mi. to the east. No. 1 East Aguasay tested high-gravity crude at a rate in excess of 1,200 b/d from 12,474-95 ft. and 12,617-52 ft. The crude is similar to that found in the Aguasay field. The wildcat, on a 12,765-acre block, is the farthest northeast production found thus far in the prolific Greater Oficina area. A second test will be drilled 3 mi. east to test the same formation.

•

NEW ZEALAND—Shell's proposed 40,000 b/d refinery—New Zealand's first—will get under way as soon as a site is selected. A new refining company, with some capital made available locally, will be formed to build the $47.6-million unit. The plant is designed to process a wide variety of crudes, including any that might be found in the current local oil hunt.

•

PAPUA—Stanvac and British Petroleum are flying in a rig to start a wildcat 15 mi. northwest of their Puri oil find (PW—Mar.13'59,p83).

The companies' first deviated hole at Puri was completed at 7,927 ft. in a mixture of oil and water. The company says it got enough information from the test to pinpoint the second deviated hole, which is now getting under way.

Mideast Oil Output Sets A New Record

Kuwait shattered its oil output record in April to push production from key Middle East producing states to a new all-time high of 4,481,300 b/d.

The tiny sheikhdom's output climbed to 1,587,600 b/d, a boost of 80,700 b/d over its previous high of 1,506,900 b/d set last November, and 222,000 b/d higher than March. Iraq's output climbed to near-record levels of 810,900 b/d. The total's, in 000 b/d:

	Apr. '59	Apr. '58	Mar. '59
Kuwait	1,587.6	1,397.9	1,365.6
S. Arabia	1,043.1	928.3	1,159.5
Iran	866.0	843.0	927.0
Iraq	810.9	633.2	759.5
Qatar	173.7	187.1	177.7
Total	4,481.3	3,989.5	4,389.3
4-Mo Avg.	4,340.2	3,989.1	

FRENCH SAHARA—A Shell affiliate expects to start drilling a second test close to its new oil find in the western Sahara (PW—May22'59,p6).

Cie. des Petroles d'Algerie's find at In Azzene, 60 mi. east of Adrar, was the first in the western Sahara, as well as the first Sahara oil found by the company. The wildcat tested 15 bbl. an hour through ¼-in. choke from 2,378-418 ft. between the Gothlandian and Lower Devonian. In an earlier test at 3,799-845 ft., the test flowed 247,200 cf/d of gas initially, dropping off later to 47,700 cf/d.

•

VENEZUELA — Creole Petroleum will spend some $97-million in Venezuela this year on continued evaluation and development of concessions, and in improving plant and equipment.

The company also announced that its net income in 1958 declined by $161-million to $235,656,375. Of this decline, $89-million was due to increased taxes; the remaining $72-million to "lower realizations." Crude output dropped 6% from 1957, to 1,080,719 b/d, and refinery runs declined 4%, to 307,904 b/d.

•

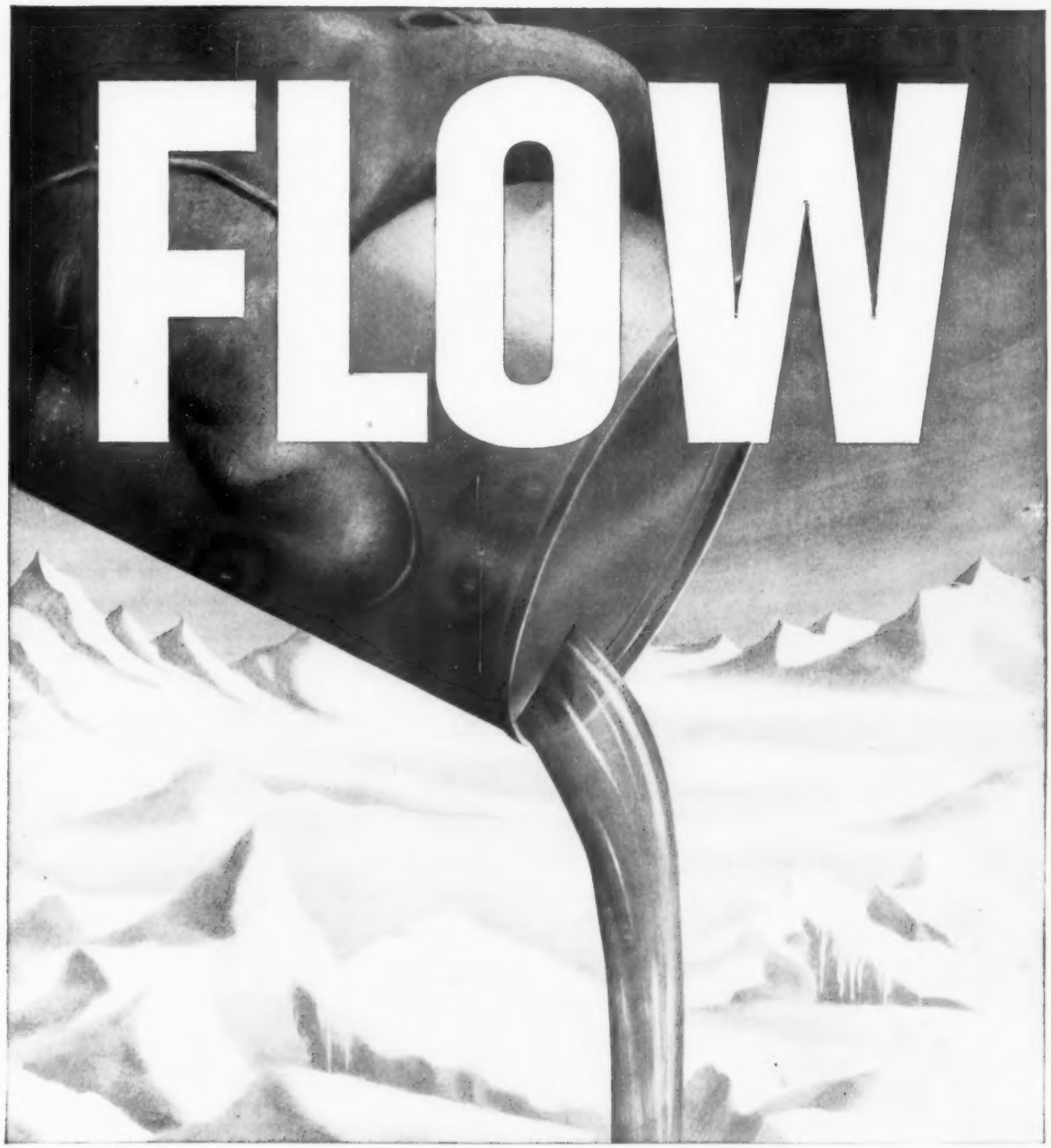
ARGENTINA—Dresser Industries will start supplying more than $10-million worth of equipment—including 20 Ideco rigs—to Southeastern Drilling Co. within a few weeks. It will be used in fulfilling Southeastern's new contract with YPF, the state oil agency, to drill 1,000 wells in the Comodoro Rivadavia area (PW—May 1'59,p49).

•

PAKISTAN—The government is rationing petroleum consumption at a level 10% below 1958. Demand last year reached 15-million bbl., including bunkers. The move stems from foreign exchange problems.

•

ARGENTINA—Italy's ENI group will be paid at the rate of $6.26 per ft., plus $50 per hour for well-finishing, to drill 300 wells in the Comodoro Rivadavia field, under its new $13-million, three-year contract with YPF (PW—May8'59,p48). The wells will be drilled to depths ranging from 4,600 ft. to 5,900 ft. Payment will be made 62% in lira, over four years at 8% interest, and 38% in pesos (25% convertible to dollars at the fixed rate of 65 pesos to the dollar, 13% at the daily free exchange rate).



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DEPT / Marketing

Research Focus on Motorists Sharpens

The American motorist will soon be subjected to the strongest ray of analysis that oil companies can project. Through the keen eyes of the market research agencies, oil will be getting a clearer look at the buying habits of the automobile driver.

The agencies, which perform around 30% of the oil industry's marketing research (the oil companies themselves do the other 70% [PW—May15'59, p147]), are sharpening their sights with an array of new techniques.

More companies will be watching the consumer through the medium of the consumer panel.

The panel consists of many hundreds of consumers who keep detailed records (consumer diaries) of their purchases at service stations, supermarkets, and other stores. By watching the changes in these diaries, oil companies can get better insight into consumer behavior.

For example, marketers can get to recognize the types of drivers who are attracted by higher octane ratings, or by trading stamps.

Although some marketers point out that the panel member tends to act differently from the ordinary driver, most marketers agree that the panel or the repeated interview (interviewing the same drivers throughout the year) does enable them to study changes in consumer buying habits. "It's the only way we can get the information we need," says J. J. Reilly, manager of consumer research at Esso Standard Oil Co.

Another market research director in a major company says a national panel enables him to keep tabs on 4,000 consumers every month.

Many researchers say that the consumer panel is a powerful tool when combined with the controlled experiment.

"Take two stations," says Samuel G. Barton, president of Market Research Corp. "Let them be identical as far as possible. Then introduce a change in station A, while keeping station B the same. By interviewing the same motorists before and after the change, you will be able to determine the value of the modification."

And the panel enables the market researcher to get "inside" ordinary controlled-experiment statistics. It permits him to know the age and backgrounds of the drivers who are attracted by changes in marketing strategy.

"If a modification attracts a large proportion of young motorists," says Barton, "it may be more important than one that generates a temporary increase in sales or is appealing to older drivers.

"Thus, the panel becomes a tool for determining long-term marketing strategy."

At least one market research agency is hunting down the influential members of a community—the consumers who influence the purchases of other consumers.

Alfred Politz Research, Inc., is now tracking down the leaders in our society, the venturesome, and the communicative. For it is these people who are first to try new products. They spread the word about a new additive or a new tire, says Robert Weller, Politz vice-president.

But where are these leaders? What do they read? What television programs do they watch? What appeals to them?

Weller frankly admits that he doesn't know yet. But if market researchers can find the community leaders and direct their advertising attack to them alone, Weller says, they may save money and still watch their sales grow as if by a chain-reaction.

How people learn is another question that concerns market researchers. Politz has found, through repeated tests, that the learning or association process must be restricted to a minimum of steps.

Politz's stress on simplicity prompted Socony Mobil to de-emphasize its Flying Red Horse symbol—too many motorists were unable to connect the symbol with Mobilgas. Now Mobil service stations clearly proclaim the word "Mobil" on their signposts.

Another market researcher is studying the delicate balance between loyalty to stations and loyalty to brands.

Once a marketer can determine the predominant type of loyalty that exists in any community, he will be able to chart his marketing strategy with more efficiency, researchers feel.

For example, if a marketer discovers a pronounced degree of loyalty to a few stations (with relative disregard for brands), he may want to improve his dealer training, develop better community relations, or build a modern two-bay station.

On the other hand, if brand loyalty is predominant among consumers, the marketing strategy may call for more billboards or other forms of advertisements to promote the brand image in the area.

This balance of brand and station loyalty also affects the optimum brand mix of tires, batteries, and accessories that should be stocked at stations.

"Consumers who are loyal to a certain station may be forced to break that loyalty if the brand of tires they want is not sold there," says one consumer research expert.

An instrument that is in the early stages of development in consumer research is the camera. It may be used as an objective tool to record the behavior of consumers as they drive into service stations. Or it may

PTA WORK AND BEING A CUB SCOUT DEN MOTHER help to keep Mrs. William R. Hugill of Livonia, Michigan, busy. In addition, Mrs. Hugill, like many wives of Standard Oil dealers, helps her husband with the office work necessary for an efficient operation.

We want you to meet some of our fair ladies

THE OTHER DAY someone remarked that the oil business was only a man's business. It isn't true—and thank heaven for that! Thousands of women have played a vital role in making Standard Oil what it is today—stockholders, employees, wives of employees, businesswomen and dealers' wives.

Here are just a few of our fair ladies. There isn't enough room on this page to print all of their pictures.

Women have an unerring instinct for quality and service and value—things on which our business is built. This is why so many women are busy *on* the scene at Standard Oil. But we are equally grateful to wives and mothers *behind* the scene. They know how to ladle out generous portions of praise and encouragement—just when they're needed the most. Progress depends on perseverance. And we count on thousands of the best bucker-uppers in the world!

A "man's business," indeed!

MISS MARY GARVEY IS A SCIENTIST in our research center at Whiting, Indiana. A graduate of Purdue University, her branch in science is chemistry. She is conducting one of hundreds of experiments that go on here continually to improve petroleum products.

MISS AGNES TOKHEIM is president of The Tokheim Company, Cedar Rapids, Iowa. Her company manufactures and sells gauges to Standard Oil. More than 30,000 independent businesses supply Standard with the services and materials needed to give you top-notch service.

BEFORE HER RECENT RETIREMENT, Miss Flora Adler was executive secretary to a Standard Oil official. An employee of Standard for more than 22 years, she is now on a world tour. Back in 1903, when retirement benefits were virtually unheard of in industry, Standard Oil started its retirement plan.

MISS MARGARET JOHNSON, an assistant principal in a Chicago high school, is shown going over a problem with George Mitchell (left) and Tom Madden. Miss Johnson is one of more than 53,000 women who own stock in Standard Oil. Standard has paid dividends in 66 consecutive years.

100th ANNIVERSARY OF THE OIL INDUSTRY
1959
100th ANNIVERSARY OF STANDARD OIL CO.

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accurately determine the visibility that is afforded a billboard. By placing the camera in front of the billboard, the number of motorists that can view the poster during a given time interval will be recorded.

One researcher is currently studying such seemingly remote sources of information as folklore, jokebooks, fairy tales, and old ballads. Dr. Ernest Dicter feels that these often help to probe into a sort of national or regional subconscious that influences consumer behavior toward certain objects (pumps or automobiles, for example).

Attitude surveys and motivation studies are seldom used by themselves in oil market research. Motivation research furnishes only ideas or hypotheses or "hunches," one researcher says; these provide the foundation on which more objective techniques may be based.

Consumers rarely know the "truth" about their own feelings toward a product, he points out. But market researchers can predict consumers' behavior by carefully studying their actions through a broad spectrum of tests. By correlating all their observations, researchers piece together a strategy that is a more effective marketing tool.

What's New / IN MARKETING

Most new-car dealers shorten the oil-change recommendations of leading car manufacturers, the American Petroleum Institute has found. Out of about 2,000 dealers in the API survey, 80% say they favor crankcase drainings after every 2,000 mi. or less.

These findings confirm a Shell Oil Co. survey of California dealers that shows dealers disagree with the 5,000-mi. oil change as recommended by some automobile manufacturers (PW—May15'59,p146).

The oil-change controversy is important to dealers because proper oil-change intervals bring new-car owners back for more service.

•

The House Ways & Means Committee will study a plan to authorize temporary use of U.S. Treasury funds for the federal highway program.

The measure would allow the Bureau of Public Roads to replenish the almost depleted Highway Trust Fund with money borrowed from the Treasury. The move sidesteps an increase in federal gasoline taxes, which President Eisenhower wants.

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Sun Oil Co. has filed a suit to prevent four Sun dealers from selling below fair-trade prices in Philadelphia.

Hearings will start June 2 in Common Pleas Court on a Sun request for a preliminary injunction.

•

Fuel sales to the small boat industry are increasing at the rate of 8% a year (compared to the 5% increase in total gasoline demand), according to Socony Mobil Oil Co., which handles the fuel and oil needs of one out of every five of the country's small-craft skippers.

The booming small-boat market is expected to consume 400-million gal. of marine fuel this year (PW—Mar. 6'59,p54).

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Take lubricants, for example

There's a USS steel container to meet almost every shipping need

Petroleum is like many other products, spending some part of its life in a steel shipping container. A wide variety of products arrive at their destinations stable, safe, sanitary, in carbon or stainless-steel shipping containers that are manufactured by United States Steel.

USS steel drums and pails come in a variety of sizes and closures, offering flexibility in choosing a shipping container, whatever you may manufacture. They represent the largest, most complete line available today, for the shipment of products as varied as paint and petroleum, chemicals and food, additives and essences.

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DEPT/Personals

S. D. BREITWEISER has been elected executive vice-president of D-X Sunray Oil Co., Tulsa, and **D. C. Wixson** administrative vice-president for marketing. In his new position, Breitweiser will have executive responsibility for D-X Sunray's marketing activities and for the company's refining and pipeline operations. He joined the company in 1957 as vice-president in charge of marketing activities, and became executive vice-president for marketing last January. Wixson, with the company since 1926, has been vice-president in charge of retail sales since 1955. He will have administration coordinating responsibility for the D-X Sunray marketing council on sales policies, programs, and procedures.

S. D. Breitweiser R. H. Horton

RAY H. HORTON has been elected vice-president of Humble Oil & Refining Co., Houston. He joined the company in 1930, and has been a director since 1955. For the past four years, he has been serving as director of employee relations, purchasing, and general services. As vice-president, he will continue in charge of these services, and will become the contact director for Humble Oil and Humble Pipe Line Co.

E. B. (Ed) THOMPSON is the new manager of foreign trade for Standard Oil Co. of California, San Francisco. He will direct activities in western hemisphere markets outside the United States and Canada. He succeeds the late **W. C. Lane.** Thompson has been manager of retail sales in the Oakland (Calif.) division since 1941.

WILLIAM B. RODAN has been named district exploration superintendent in Pan American Petroleum Corp.'s Denver office. He succeeds **Ross W. Craig,** who has been transferred to an assignment in Alaska.

REIMER E. PROBST is the new group leader in charge of information research at the Whiting (Ind.) research laboratories of Standard Oil Co. (Ind.). Probst, with Indiana Standard since 1950, most recently specialized in improving oils and studying how they lubricate.

ROGER N. STARK has been promoted to eastern sales manager for Tennessee Gas Pipeline Co., a division of Tennessee Gas Transmission Co. He will be headquartered in Washington, D.C. Stark, with the pipeline company since 1950, was most recently senior sales representative in Houston.

G. D. Murdoch R. L. Wood

ROBERT L. WOOD and **G. D. MURDOCH** have been elected directors of Ambassador Oil Corp., Ft. Worth. Wood is owner of Basin Drilling Co., Midland, Tex., and a past president of the Independent Petroleum Assn. of America. Murdoch is manager of the underwriting and new business department of Dempsey-Tegeler & Co., members of the New York Stock Exchange headquartered in Los Angeles.

KENNETH E. MONTAGUE has been named petroleum engineering counselor for Sun Oil Co.'s domestic production department, with headquarters in Beaumont, Tex. In his new position, he will serve all domestic producing divisions in the United States and Canada. He was formerly supervisor of the reservoir study section in the operating department of Sun's Gulf Coast division.

ROY A. HERBERGER becomes administrative assistant to the manager of the Ft. Worth division of Texaco Inc. He succeeds **Joe W. Coffman,** who has resigned. Herberger was formerly supervising accountant at Texaco's Dallas office.

D. R. Hagerman R. G. Maclellan

D. R. HAGERMAN is the new treasurer, and **R. G. P. MacLELLAN** secretary, of Canadian Husky Oil, Ltd., Calgary. Hagerman joined Canadian Husky in 1957 as assistant to the vice-president in charge of finance. Before that, he was associated with the accountant firm of Winspear, Hamilton, Anderson & Co., also in Calgary. Maclellan joined the company in 1950, and served as manager of the land department from 1952 to 1958, when he became manager of the legal department.

J. H. RALEY and **J. C. DYGERT,** research scientists at Shell Development Co.'s Emeryville (Calif.) laboratories, will spend a year at Royal Dutch Shell laboratories in the Netherlands. Raley will be assigned in Amsterdam, and Dygert in The Hague. Raley is a research supervisor at Emeryville, and Dygert is an engineer in the mechanical and electrical engineering department. Both men will begin their assignments this summer.

HERMAN G. GUNTER has joined Commonwealth Oil Refining Co., Ponce, Puerto Rico, as assistant refinery manager. He was associated with Standard Oil Co. (N.J.) companies for 22 years, and was most recently associated with Suntide Refining Co. and Commerce Oil Refining Corp.

GEORGE P. MITCHELL is the new president of Christie, Mitchell & Mitchell Co., Houston, a specialist firm engaged in oil and gas geology, engineering, drilling, and production. He succeeds his brother, **Johnny Mitchell,** who becomes vice-chairman of the board. At the same time, Johnny Mitchell was also named president of Blue Oil Co., a CM&M subsidiary. Other parent company personnel assigned to new duties are: **B. F. Clark,** vice-president and general manager; **M. D. Thompson, Jr.,** vice-president of production; **S. A. Parkans,** vice-president of geology; **L. D. Brooks,** assistant to the president for land trades; **J. F. Harrison,** vice-president and financial controller; **A. N. Fritz,** treasurer and chief accountant; **Obbie Lewis,** manager, contracts and purchases, and **P. T. Powell,** manager, land department.

G. P. Mitchell A. B. Hersberger

DR. A. B. HERSBERGER has been appointed general manager of Atlantic Refining Co.'s foreign marketing department, in Philadelphia. He will be responsible for the company's over-all program of foreign marketing involving crude oil, finished products, marketing subsidiaries, and further marketing development. Hersberger, who continues as a member of the general marketing staff, will also direct certain domestic sales activities. He joined Atlantic in 1936, and most recently has been manager of the headquarters sales and special services department. In addition, he has served as president of Atlantic Chemicals, S.A.B. (Belgium), and as a director of Atlantic Refining Co. of Brazil.

The care and feeding of the "Chopper" . . .

. . . is one of the many uses for high octane gasoline as America becomes more air-minded.

The production of the blending components of high octane fuel is the principal application of Skelly Oil Company's HF alkylation unit at El Dorado, Kansas, pictured above.

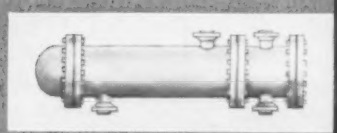
Utilizing dried olefins and isobutane as charges, Skelly employs Western Heat Exchangers as acid-hydrocarbon reactors, thus helping to simplify the unit operations with consequent reductions in both investment and operating expense.

WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY COMPANY

P.O. Box 1888 – Tulsa, Oklahoma



Let Western's engineering and design specialists assist in the solution of your heat transfer problem — for greater efficiency and economy.

See Western's Data Pages in the latest edition of Chemical Engineering Catalog.

One Battle We're Losing —And Why

Lest it seem self-serving, we of McGraw-Hill, as publishers, have hesitated to make the following statement about the "Battle of the Books." However, our reticence has been overcome by our conviction that it is greatly in the national interest to have much wider public understanding of the nature of this battle. This conviction is strengthened by the fact that many, not in the publishing industry, believe in the importance of this battle and, further, by the fact that it is a battle which the United States is losing.

The United States is losing an important battle — a battle of knowledge and ideas, waged with books. It does not have the excitement of competition in scientific achievement, nor the urgency of a diplomatic crisis, nor the obvious economic significance of a struggle for export markets. But our success or failure in this battle of knowledge and ideas may well have a decisive bearing on these more spectacular aspects of international rivalry.

The Russians know this. About a decade ago, they started a program to build up their export of books, the most durable and penetrating way of communicating knowledge and ideas. **By 1957 the Soviet Union was exporting 30 million books, one-and-a half times as many as the United States.** Many of these books are printed in English, and all are in languages of the non-Communist world.

In the languages of the Near East alone, the Russians printed and distributed 413,600 books in 1957, as compared with 166,415 in 1956. In India, Russian textbooks on engineering are to be published in English under a technical aid agreement signed in Moscow last December.

"Trade Follows The Book"

Books are in the advance guard of the Soviet political and economic challenge to the free world. With books go ways of thinking — about government, about education, about management, about science and technology. If these books do their job effectively in the training of those who will become a nation's leaders, they will provide the basis for political and cultural understanding and also, in the future, for trade.

The Russians are not the first to discover this relationship. Britain, which lives by trade, has traditionally exported more of its book production than any other nation. Today it exports one book in every two produced. The British have a favorite dictum: "Trade follows the book." They have proved its accuracy. Now the Russians are trying to make this same principle serve their purposes.

Where does the United States stand in this competition for men's minds? In number of books, it trails far behind the Soviet Union — exporting roughly 20 million books, against the Russians' 30 million. As a proportion of our total output of books, our exports amount to only 10% — against Britain's 50%.

The Russians' Advantage

U.S. book exports have grown in the years since World War II, from approximately $11,000,000 in 1946 to $35,000,000 in 1958 (both figures excluding Canada). But in expanding book exports, the American publishing industry faces two major obstacles:

(1) **The comparatively high cost of producing a book in the United States,** which puts its price well beyond the reach of many students, teachers and businessmen in other countries; and

(2) **The shortage of dollar exchange in many countries,** which means that importers can pay for

books only in currencies that are of little use to American publishers.

The Russians have neither of these problems. Soviet publishing is state-subsidized, and exported books are sold for nominal sums paid in the currencies of the importers. As these books serve the political and economic purposes of the Soviet Union, they are cheerfully sold on giveaway terms.

The American publishing industry, on its own, is making vigorous efforts to increase the distribution of American books in other countries. Leading U.S. publishers and their agents have offices and salesmen in the major countries of Asia, Africa and Latin America. Several publishers have begun to reprint textbooks in Asia at one-half to one-third of their U.S. costs, thus making them available to the students in Asian countries at prices they can more nearly afford. And the American paperback has become a symbol of low cost in popular books. But neither of these devices is practicable for serious cultural, technical, scientific, educational and professional books, which require durable, hard-bound and necessarily expensive editions. Despite their great importance to those who need these books, the demand for them is simply not large enough to warrant low-cost publishing methods.

Government agencies also have increased the availability of American books. The United States Information Agency and the International Cooperation Administration have placed American books in libraries overseas, donated them to educational institutions and presented them to key individuals in the industries and governments of the developing countries of the world. But these programs are small in relation to the need.

A Modest Program

An unusual and little-publicized Government program has helped American publishers overcome the other major obstacle to the export of books — the shortage of dollar exchange. This is the Informational Media Guaranty (IMG) program, administered by the United States Information Agency. It enables publishers of books judged to be worthy of the American way of life to sell their books, for local currency, in countries such as the Philippines, Formosa, Vietnam, Burma, Indonesia, Pakistan, Turkey, Israel, Poland, Yugoslavia, Spain and Chile, which would otherwise be unable to buy these books because of their shortage of U.S. dollar exchange.

The IMG program is not a giveaway. Publishers have to **sell** their books, and customers overseas have to want them enough to **buy** them at full prices. IMG merely guarantees that the exporting publisher receives in dollars the payments he collects from his customers in their currency. The program costs very little in terms of our total foreign aid program, or in terms of what it accomplishes. In ten years it has made possible the sale of $150 million worth of books, magazines and films to countries of key economic and strategic importance at a cost of only $10 million.

The IMG functions through a revolving fund. Foreign currencies are exchanged for dollars, and the foreign currencies in turn are resold to replenish the supply of dollars. The net cost is the small but unavoidable loss on resale of these foreign currencies. Over the ten years of this program, the IMG revolving fund has shrunk from its original $28 million to $18 million, $10 million of which is in unconverted foreign currencies.

If this modest but vitally important program is to be continued, Congress must appropriate the money necessary to rebuild the revolving fund. This would ensure that any country approved by the State Department and willing to sign an agreement to buy American books, at their full price, with its own currency, could do so. Last August, Congress reduced a requested appropriation for this purpose from $7 million to $2½ million. To continue even at its present reduced level, an appropriation of $3½ million is needed. To realize the full potential of IMG, the revolving fund must be restored to its original level.

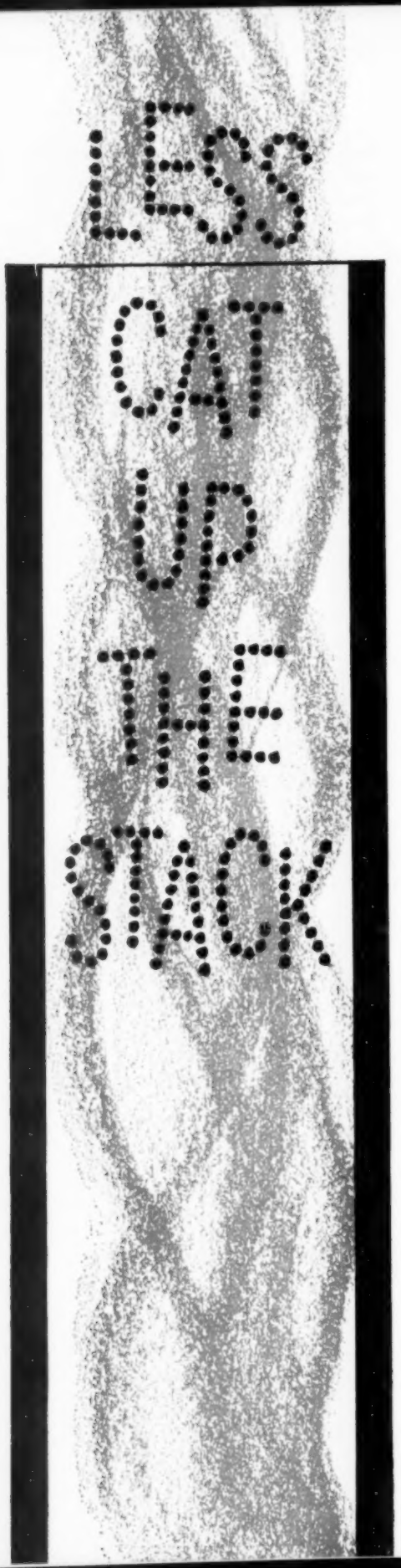
If the IMG program is not continued, with adequate financial support, some countries whose friendship and understanding we seek today and with whom we hope to build a trading partnership in the future will have to reduce their purchases of American books to a trickle. These are countries where school teachers, college professors, students, engineers, doctors and businessmen need and want to buy American books. The loss will be not only theirs, but ours as well. For it will deprive the U.S. of one of its most effective, and least costly, means of communicating knowledge and ideas and understanding of the American way of life.

This message is presented by the McGraw-Hill Publishing Company to help increase public knowledge and understanding of an important national problem. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.



with Davison Catalysts

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With Davison Catalysts you get the lowest amount of unretainable fines.

With Davison Catalysts you get lower attrition. The lower breakdown rate of Davison Catalysts means you get the fines you need without light particles escaping up the stack.

The reason: *balanced density*. There's a Davison Catalyst to suit your application. Write Department 4115, today for Product Service Bulletin No. 59-101.

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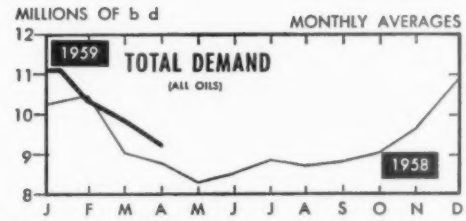
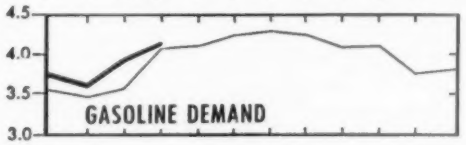
PETROLEUM WEEK'S

Fingertip Figures



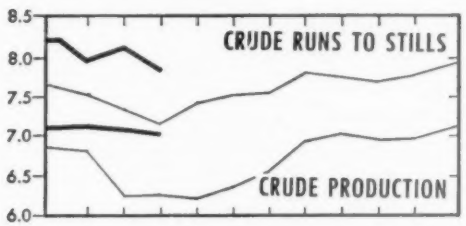
TOTAL DEMAND

Latest 4-week average	8.932
Year ago	8.439



GASOLINE DEMAND

Latest 4-week average	4.258
Year ago	4.122

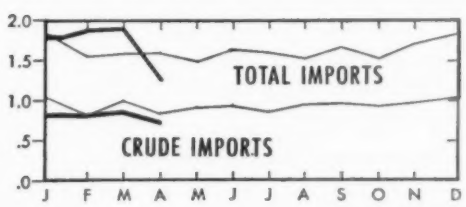


RUNS TO STILLS

Latest week	7.891
Previous week	7.684
Year ago	7.331

CRUDE PRODUCTION

Latest week	7.213
Previous week	7.178
Year ago	6.256

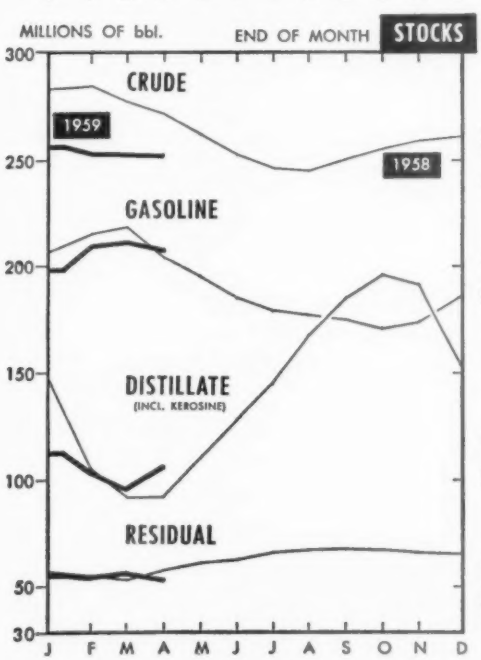


TOTAL IMPORTS

Latest week	1.363
Previous week	1.324
Year ago	1.324

CRUDE IMPORTS

Latest week	.860
Previous week	.904
Year ago	.904



CRUDE STOCKS

Week-ended 5-16	259.1
Previous week	255.8
Year ago	273.0

GASOLINE

Latest week	203.6
Previous week	206.6
Year ago	195.8

DISTILLATES

Latest week	117.0
Previous week	112.2
Year ago	105.2

RESIDUAL

Latest week	54.5
Previous week	54.6
Year ago	60.4

Imports Administrator Matthew V. Carson, Jr., said last week that it is "economic nonsense" to say that import controls are the cause of excessive refinery runs.

He went on to say that it is "fallacious reasoning" to attribute the present level of refinery activity to the fact that import allocations are based on a sliding percentage scale of refinery throughput.

Carson's statement was at odds with one made earlier in the week by J. G. Coates, manager of domestic crude sales and purchases of Gulf Oil Corp.

He said at the Texas Railroad Commission's statewide hearing that runs are "at least 500,000 b/d too high." He added: "The obvious conclusion is that imports controls are encouraging excessive runs."

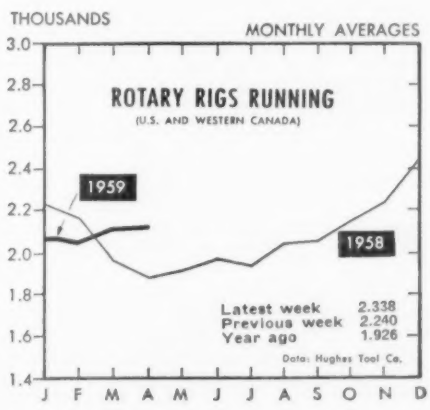
While it may be difficult for many to agree with Carson's denial that import controls are causing high runs, few would disagree that the present level of runs amounts to "economic nonsense."

Last week, for example, several more companies announced reductions in refinery operating rates. In some cases, the reductions were in addition to cuts announced earlier.

Yet the API statistical report for the week shows that runs increased 207,000 b/d over the previous week.

Carson made economic sense by commenting there is no point in a refiner increasing runs just to get a higher import allocation "when he has no place to sell his products."

Yet inventories are at an excessive level. Gasoline demand so far in May has been 3.3% ahead of last year, yet stocks have declined by 6-million bbl. this month, compared with a 7-million-bbl. decline in the previous May.



The Market Trend

The Independent Is the Vanishing Oil Man

The trend to buy up independents, or to tie up their gallonage, seems especially strong right now. Mention any big jobber, and somebody will dig up a rumor of a stock swap with a major, a branded dealership, or a free terminal if he buys his oil in the right place for ten years.

This week, Ohio Oil Co. lined up a purchase agreement for the properties of Aurora Gasoline Co. of Detroit. (Ohio just nosed out Ashland, American Petrofina, Jersey Standard, and Phillips.) Earlier this month, a purchase deal was worked out on Globe Fuel Products Co. of Chicago. Last week, it was Coastal Oil Co. of Newark. Next week, for sure, it will be some other company.

"If this keeps up, there won't be many of us independents left," is the comment you hear. Swezey Fuel, a Long Island retailer is touted for a major-brand paint job on his trucks on June 1. Feelers have been put out for an old-line private-brand gasoline operation in the Northeast. There's a "right of first refusal" clause in the supply contract of a big midwestern jobbership. And so on.

The majors appear to be working on the thesis that if you're worried about selling oil to a reseller, you can always buy him out. This is what is called the "base-load" principle. In English, it says that there still is money in crude production, but to lift a barrel of crude you first have to sell a barrel of products.

This frantic reaching for independents is an outgrowth of spare producing capacity. Crude oil looks in long supply for years ahead. And when there is no foreseeable scarcity of oil, then the seller of products who controls the final sale—to the consumer—has much to say about whose crude will be lifted.

And the rage to control gallonage has tended to break down the markets, because the independents, the traditional cap-in-handers, have learned to talk tough. When they buy crude, they ask for a "cost-of-production" deal. When they buy products, they want "storage and wharfage allowances." The implied threat is that they can always sell out to a competing supplier.

Strangely enough, all signs point to a strengthening of competition as majors reach for independent gallonage. You might assume there would be less competition when there are fewer companies around. But the ones that are left are going to be much rougher.

Gasoline Moves West to East:

The shocker this week came when a major oil company arranged to move a cargo of gasoline from California to the East Coast. With import curbs in effect, the West Coast ought to be lean on gasoline and long on heavy fuel.

What bothered traders was the waste of effort involved in shipping gasoline to the East. For the principal movement of gasoline this season has been from the Gulf Coast west to California.

N. Y. Fuel Bids:

Bids to supply the City of New York with fuel oil were about as close as you could find. Prices of three of the winners for No. 6 fuel, delivered in trucks, were 5.38¢, 5.39¢, and 5.40¢.

another
TRETOLITE SERVICE
report

THESE USE-PROVEN PRODUCTS CUT MANUFACTURING AND MAINTENANCE COSTS

TRET-O-LITE* *Demulsifiers*

TRET-O-LITE Demulsifying Chemicals separate an aqueous phase from a hydrocarbon phase, or vice versa.

Separation procedure consists simply in mixing a small proportion of the selected TRET-O-LITE with the emulsion and providing suitable storage where the oil and water can separate.

TRET-O-LITE Demulsifiers are used to treat tank "bottoms," also Bunker "C" fuels for the removal of salts and trace metals to permit the use of such fuels in gas turbines.

TRET-O-LITE* *Chemical Desalting*

TRET-O-LITE Chemical Desalting removes harmful salts from crude oil in the 95% to 100% efficiency range, and is currently being used to process over 1½ million barrels of crude daily. Chemical costs average 1.3 mills per barrel.

Experienced Tretolite refinery service engineers inspect construction, supervise start-up and make periodic inspections of the Tretolite desalting equipment. It can be purchased, rented, rented with option to purchase, or constructed by the refiner according to plans furnished by Tretolite.

KONTOL* *Corrosion Inhibitor*

KONTOL Corrosion Inhibitor is a liquid organic semi-polar compound, available in various formulas. It adsorbs onto metal surfaces to form impervious corrosion-inhibiting film. KONTOL Corrosion Inhibitors prevent corrosion in hydrocarbon distillation systems by protecting against attack by chlorides, sulfides, organic acids, other corrosive agents and hydrogen blistering. They also have effective detergent properties at temperatures above those considered normal for this type of inhibitor.

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TOLAD Fuel Oil Additives are ashless, totally oil-soluble compounds designed to enhance the stability of domestic heating oil and diesel fuels, as regards color and residue. These additives exhibit excellent water tolerance characteristics reducing sludge formation and loss to water bottoms in fuel storages. They are available as inhibitor or inhibitor-dispersant formulations.

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KUPLEX Metal Deactivator prevents the pro-oxidant effects of copper and its compounds from causing the degradation of petroleum distillates. It prevents degradation reactions by tying-up the dissolved metal as an inactive stable chelate. At concentrations as low as 8 ppm it can reduce anti-oxidant requirement and assure fuel stability. It is effective in gasoline, kerosine, jet fuel, diesel fuel, furnace oil and turbine oil.

TRET-O-LITE* *Water De-Oilers*

The disposal of refinery wastes often results in the loss of valuable refined products, may also lead to the creation of a stream pollution nuisance. Many refiners use TRET-O-LITE Water De-Oilers to correct such problems. The efficient demulsification of waste oil emulsions often makes possible the salvage of large quantities of oil, as well as the lessening of the pollution problem. Tretolite chemicals are in daily use for reclaiming oil from slop disposal systems and separator traps.

For complete information on these, or any Tretolite Company product or service, *ask the Man in the Red Car,* or write

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The Market Place AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All prices as of May 25

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U. S. Gulf Coast, cargoes
- **Gasoline, 98 oct prem** ..... **11.75↓-13**
- **Gasoline, 92 oct reg** ..... **10.5↓-11.5**
- Kerosine 9.125-10.375
- Heating oil, No. 2 ..... 8.625-9.875
- Gas oil, 48-52 d.i. 8.875-10.125
- Fuel oil, bunker "C" $2.00-2.10

Caribbean, cargoes
- Avgas, Grade 100/130 16
- **Gasoline, 93 oct research prem** ..... **10.75↓-11**
- **Gasoline, 87 oct research reg** ..... **9.875↓-10.125**
- Gasoline, 79 oct research 9.125
- Gasoline, 70-72 oct motor method 9
- **Kerosine** ..... **9.375↓**
- **Heating oil, No. 2** ..... **8.625↓**
- **Gas oil, 48-52, d.i.** ..... **8.875↓**
- Fuel oil, bunker "C" $2.00

New York Harbor, barges
- Kerosine 11
- Heating oil, No. 2 ..... 10-10.5
- Fuel oil, No. 6 ..... $2.37-2.45

Okla-Group 3, northern shpt., bulk
- Gasoline, 89 oct reg 11.5-12.5
- Kerosine 10.25-10.75
- **Heating oil, No 2** ..... **9.925↓**
- **Fuel oil, No. 6** ..... **$1.70↓-1.90**

Chicago, bulk
- Gasoline, 91 oct reg 11.75-12
- Heating oil, No. 2 ..... 10-11.35
- Fuel oil, No. 6 high sulfur 7.4-7.5

Los Angeles, rack
- **Gasoline, 88 oct reg** ..... **12↓-12.65**
- Diesel fuel, PS 200 ..... 8.5-11.25
- Light fuel, PS 300 ..... $2.80
- Heavy fuel, PS 400 ..... $2.15-2.35

Natural Gasoline, Grade 26-70
- FOB Group 3 ..... 4.5
- FOB Breckenridge, Tex. 4

LP-Gas
- Propane, Oklahoma (Group 3) 4

Pennsylvania Lubes
- Bright stock, 25 p.t. 22
- 200 vis. neutral, 25 p.t. 21

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent 95 v.i. 23-24
- Neutral, solvent, 200-210 vis. 19.5-20.5

Gulf Coast Lubes
- Bright stock, solvent, 95 v.i. 24
- Neutral, solvent, 200 vis. 20.5

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes
- Avgas, grade 100/130 ..... 17.25
- Gasoline, 79 oct research 9.75
- Kerosine 10.75
- **Gas oil, 48 d.i. minimum** ..... **10.375↓**

KEY PRICES—CRUDE OIL

(2¢ differential per deg., of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- Mid-Continent, 36.0-36.9 ..... $2.77-2.97
- North Dakota, 36.0-36.9 ..... 2.62-2.87
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9 ..... 3.50
  - Gulf Coast, Upper & Lower, 26.0-26.9 ..... 2.92-3.22
  - West Texas, sweet, 36.0-36.9 ..... 3.00
  - West Texas, N. M., inter., 36.0-36.9 ..... 2.93
  - West Texas, N. M., sour, 32.0-32.9 ..... 2.71
  - East Texas, flat 3.25
  - Mirando, 28.0-28.9 ..... 3.31
- Illinois Basin, flat 3.00
- Pennsylvania Grade, Bradford dist., flat 4.25
- California, Signal Hill, 21.0-21.9 ..... 2.50-2.54†
- North Louisiana-Arkansas, 36.0-36.9 ..... 2.77-3.02
- Wyoming, sweet, 36.0-36.9 ..... 2.85-2.90
- Wyoming, sour, 32.0-32.9 ..... 2.63-2.71

Canada (flat prices, at the well)
- Acheson-Stony Plain (Alta.) $2.47
- Leduc-Woodbend (Alta.) 2.53
- Redwater (Alta.) 2.42
- Daly (Man.) 2.21
- Smiley (Sask.) 2.18

Venezuela (Cargoes, FOB lifting port designated)
- Cumarebo, 47.0-47.9, Tucupido $3.34
- San Joaquin, 41.0-41.9, Puerto la Cruz 3.10
- Oficina, 35.0-35.9, Puerto la Cruz 2.78-2.80
- Tia Juana, Medium, 26.0-26.9, Amuay 2.30
- Bachaquero, flat, Las Piedras 1.73-1.88
- Tarra, 38.0-38.9, San Lorenzo 2.83
- Lagunillas Heavy, flat, Cardon 2.10

†*Differential per deg. of grav. varies.*

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- Arabia, 34.0-34.9, Ras Tanura $1.89-1.90
- Safaniya, 27.0-27.9, Ras Tanura 1.50
- Iran, 34.0-34.9, Bandar Mashur 1.86-2.04
- Iran, 34.0-34.9, Abadan 1.81
- Iraq, 35.0-35.9, Fao 1.80
- Kuwait, 31.0-31.9, Mina-al-Ahmadi 1.67
- Qatar, 41.0-41.9, Umm Said 2.05
- Neutral Zone, Burghan, 23.5-24.4, Mina Saud 1.51
- N. Zone, Eocene-Ratawi, 20.5-21.4, Mina Saud 1.38

Middle East, Eastern Mediterranean
- Arabian, 34.0-34.9, Sidon $2.27
- Iraqi, 36.0-36.9, Tripoli, Banias 2.31

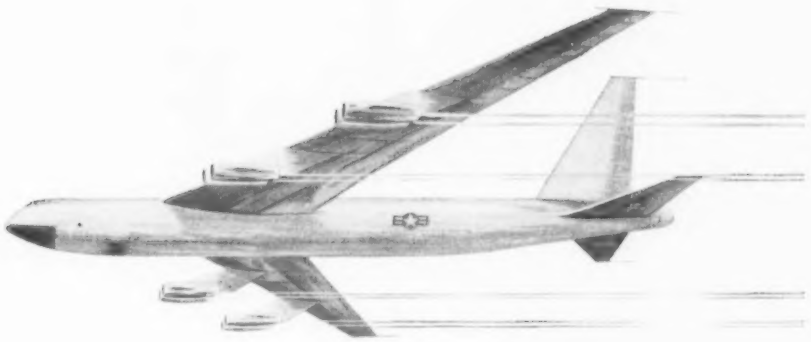
Far East, Cargoes, FOB Lutong, Sarawak
- Seria Light, flat $2.57

KEY TANKER RATES

(Last paid, per long ton, single voyage)

- **U. S. Gulf-New York, clean (USMC—20%) $2.38↑**
- **U. S. Gulf-New York, dirty (USMC—32½%) $1.92↑**
- **NWI-USNH, dirty (USMC—62½%) $1.01↑**
- NWI-UK/Cont., dirty ..... (Scale—30%) 22/9*
- Persian Gulf-UK Cont., dirty ..... (Scale—70%) 20/10*
- Persian Gulf-USNH, dirty ..... (USMC—75%) $3.18

**Sterling.*



she floats so jets can fly!

GATCO-200 . . . a new 230'x 43'x 15' oil barge built by INGALLS at its Decatur, Alabama Yard for Gulf Atlantic Towing Corporation of Jacksonville, will carry jet fuel for the armed forces. It is scheduled for coastwise service . . . has INGALLS exclusive patented bow, which reduces towing resistance, plus skegs to improve towing characteristics in coastal waters. It has a capacity of 20,000 barrels . . . is equipped with anchor and anchor-handling equipment and two Diesel-engine-driven pumps for unloading cargo. The GATCO-200 is further proof of INGALLS' ability to build the right barge for the right job at the right price. *On your next barge job, large or small, check with* INGALLS!

THE INGALLS SHIPBUILDING CORPORATION

Executive Offices: Birmingham, Alabama / Shipyards: Decatur, Alabama • Pascagoula, Mississippi (Two yards on the Gulf)

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(Classified Advertising)
EMPLOYMENT • BUSINESS
EQUIPMENT — USED OR RESALE
OPPORTUNITIES

DISPLAYED RATE
EQUIPMENT & BUSINESS OPPORTUNITY advertising $16.75 per inch.
EMPLOYMENT OPPORTUNITIES — $28.00 per inch, subject to Agency Commission.
UNDISPLAYED RATE
(Not available for equipment advertising)
$1.80 a line, minimum 8 lines.
POSITIONS WANTED undisplayed rate is one-half of above rate, payable in advance.
Box Numbers—Count as one line.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

. . . ESTABLISHED OHIO ASPHALT REFINERY WANTS SUPERINTENDENT

ASPHALT EXPERIENCE DESIRABLE THOUGH GENERAL REFINERY EXPERIENCE SUITABLE. EXCELLENT OPPORTUNITY FOR RIGHT MAN. RESPOND . . .

P-1743 PETROLEUM WEEK
520 N. Michigan Ave., Chicago, Ill.

WANTED—2 SALES SUPERVISORS

Ada Oil Company requires the services of two sales supervisors thoroughly experienced in motivating and directing salesmen working with service station dealers. These opportunities, duties and salaries are not for trainees. Reply by letter only, confidentially outlining your experience, training, age and salary requirements to Ada Oil Company, Director of Personnel, P. O. Box 844 Houston 1, Texas.

SALES EXECUTIVE

Established oil company wishes to employ individual who has had petroleum marketing experience at the executive level. Salary commensurate with experience and proven ability. Send background resume. All information confidential.

P-1648, PETROLEUM WEEK
Class. Adv. Div., P.O. Box 12, N. Y. 36, N.Y.

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NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
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POSITIONS WANTED

Company Pilot & Staff Ass't. Degrees BBA & MBA, age 27. Experienced Com'l. Pilot, Single and Multi with Instrument. Resume on request to PW-1723, Petroleum Week.

Accountant, Landman, office manager. General Administrator. 20 years' experience in crude oil production, desires connection with independent or individual on a salary plus participation basis. Capable of originating and completing deals. PW—1750, Petroleum Week.

Your Inquiries to Advertisers Will Have Special Value . . .

—for you—the advertiser—and the publisher, if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publishers to secure more advertisers and —more advertisers mean more information on more products or better service—more value—to YOU.

DEPT/Service & Equipment Companies

GILBERT T. BOWMAN has been elected vice-president of Rockwell Mfg. Co. He will be in charge of the international division and the petroleum and industrial division. Bowman joined Rockwell in 1940 as a meter and valve sales engineer in Northern California, and was most recently assistant vice-president of Rockwell's meter and valve division.

J. R. Brown, Jr.

G. T. Bowman

JAMES R. BROWN, JR., has joined Dresser Industries, Inc., as director of manufacturing, with offices at executive headquarters in Dallas. He was formerly associated with Baldwin-Lima-Hamilton Corp., in Eddystone, Pa. In his new position, he will report to **John Lawrence**, executive vice-president, who is in charge of the Dresser capital goods companies. Brown will also be a member of Dresser's headquarters staff.

FRANKLIN P. FREDERICK has joined Bonner & Moore Engineering Associates, Houston. He was previously associated with Humble Oil & Refining Co. and Esso Standard Oil Co. His work with these two companies included operations research techniques, computer applications on problems of supply and demand, inventory control, and gasoline blending.

LOUIS T. MONSON, general manager of Tretolite Co. of California division of Petrolite Corp., has been named a vice-president of Petrolite. Prior to his appointment as general manager of the California division, he was chief chemist and research director there.

ROBERT F. DOOLITTLE has been elected general counsel and secretary of Youngstown Sheet & Tube Co., Youngstown, Ohio. He succeeds **Judge James E. Bennett,** who is retiring. Doolittle has been serving as assistant general counsel and as assistant secretary. **William J. Harnisch** has been elected assistant secretary. He has been a member of the company's legal staff since 1956.

GLENN E. BLACKLEDGE is the new vice-president in charge of Canadian operations for Seismograph Service Corp. of Canada, Calgary. He was most recently manager of continuous velocity logging for the Canadian company.

LEO DeFIORE has been appointed director of engineering, and **Carl J. Lucas** succeeds him as chief engineer, of Youngstown Sheet & Tube Co., Youngstown, Ohio. DeFiore has been chief engineer since 1956, and Lucas has been assistant chief engineer in charge of projects and development since 1957.

W. K. Warren

M. E. Montrose

M. E. MONTROSE, vice-president in charge of sales for Hughes Tool Co., accepted an International Petroleum Exposition Gold Plaque for Hughes Tool at the recent IPE meeting in Tulsa. **W. K. Warren**, IPE president, and chairman of Warren Petroleum Corp., presented the plaque, which cites Hughes for "the years of outstanding contributions to the petroleum industry world-wide through continuing research and field service to advance drilling efficiency."

engine power
BY CATERPILLAR

In oil field work, lugging ability is extra important and Cat Diesels have the torque rise to give it to you!

Every oil man knows the importance of engine power that can handle sudden heavy loads efficiently and without stalling out. The torque rise built into Caterpillar Diesels can deal with any ordinary power challenge. High torque capacity pays for itself when pulling pipe. Cat Engines respond by developing more *turning* force for steady power application as engine speeds drop.

In Cat power plants, torque rise characteristics are an important part of engine design. Torque rise for best lugging ability is a function of engine breathing. It depends on fuel injection and metering, too. In addition, Cat power packages provide an exclusive torque spring for greater efficiency. This device makes it possible to provide maximum engine torque at any *predetermined* engine speed. By using springs with varying tensions, you can change the RPM at which maximum torque will occur, and custom-fit your Cat Engine to any specific application!

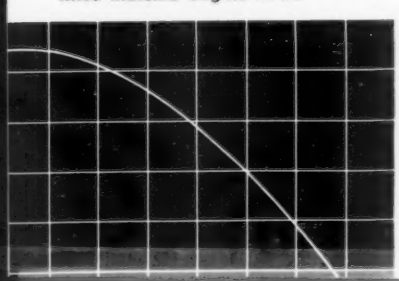
Engine Division, Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

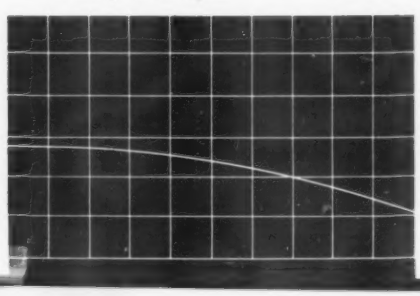
What is lugging ability or torque rise? When the throttle of an engine with no load is wide open, the engine runs at high idle. As load increases, the engine slows, *providing the torque—or turning force—necessary to match the load.* An engine operates at "lug" when load requirements momentarily demand more torque than that available at rated speed. Good lugging ability is represented by rapidly-increasing torque characteristics over a wide speed range as RPM drops.

Cat's exclusive torque spring provides *additional* fuel delivery to the cylinders under lug conditions—materially increasing engine torque at reduced engine speed.

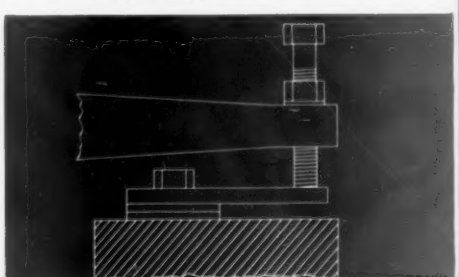
Cat Engines have high torque rise **as indicated here. Horizontal lines show torque measured in lb.-ft. Vertical lines indicate engine RPM.**



Most competitive engines **have comparatively less torque rise, which means inadequate lugging ability. This can be costly on the job.**



Torque spring. **This is the Cat exclusive which permits you to select the engine speed at which you desire your maximum engine torque.**



W. A. (Bill) COULSON becomes production manager for Alberta Oil Tool Co., Ltd., Edmonton. He was formerly Calgary representative for the company. He succeeds **George Bulgin,** who has resigned to take a post connected with missile development in the United States.

W. A. Coulson

F. de Cordova

FORD de CORDOVA is district manager of Hunt Tool Co.'s new sales and service point at Morgan City, La. He was formerly Hunt's district manager at Jennings, La. **Thomas A. Kennard,** formerly a sales representative for the company in the Houston area, succeeds de Cordova in Jennings.

DAVID MUIR is manager of a new logging station in Jackson, Miss., recently opened by Empire Geophysical, Inc. Muir has been with Empire since 1957, and was most recently district engineer at Odessa.

WILLIAM W. SIMONS becomes applications engineer for Milwaukee Valve Co., Milwaukee. In his new position, he will specialize in product application activities with oil companies, aircraft refueling services, tank truck builders, and oil marketing equipment dealers. Simons joined the company in 1957 as materials engineer and purchasing agent.

RICHARD F. ARNOLD is the new district manager in charge of Walworth Co.'s Oklahoma sales, with offices in Tulsa. He has been with Walworth for six years as a salesman in the Dallas, Ft. Worth, and Wichita Falls areas.

AUSTIN J. HOFFMANN has joined the gas equipment and chemical catalysts sales department in the chemical division of Engelhard Industries, Inc. He will be headquartered in Newark, N. J. He was previously associated with International Nickel Co., New York, as an operations engineer.

GLENN DOGGETT has been named area sales manager for GO Oil Well Services' new Abilene (Tex.) branch. In his new position, he will direct the company's logging and perforating services in the West Texas area. Doggett has been engaged in wire line work for the past ten years.

R. W. Wire

D. Ballew

J. O. Rundle

DORRIS BALLEW is the new chairman, and **ROBERT W. WIRE** the new vice-chairman, of all Loffland Bros. companies, and **JOHN O. RUNDLE** is the new president of all Loffland Bros. foreign companies. Ballew formerly served as vice-chairman of the Loffland Bros. Co. and of Loffland Bros. Co. of Canada. He succeeds **Ken Davis, Jr.,** who has been named president of Kendavis Industries, Inc., International. Wire, president of Loffland since 1948, also becomes president of Loffland Bros. domestic companies. Rundle with Loffland since 1928, was most recently vice-president of operations. The three will be located at Tulsa.

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Atlanta 3 — Douglas C. Billian, 1301 Rhodes-Haverty Bldg., Jackson 3-6951

Boston 6 — Donald R. Thompson, 350 Park Square Bldg., Hubbard 2-7160

Chicago 11 — Edward A. Callahan Jr., H. Sherman Davis, 520 North Michigan Avenue, Mohawk 4-5800

Cleveland 15 — J. E. MacArthur, 1164 Illuminating Bldg., 55 Public Square, Superior 1-7000

Denver 2 — J. W. Patten, Mile High Center, 1740 Broadway, Alpine 5-2981

Houston 25 — D. O. Hanson, 724 Prudential Bldg., Jackson 6-1281

Los Angeles 17 — Peter S. Carberry, 1125 W. Sixth St., Huntley 2-5450

New York 36 — Donald R. Thompson, 500 Fifth Ave., Oxford 5-5959

Philadelphia 3 — W. A. Potter, 6 Penn Center Plaza, Locust 8-4330

San Francisco 4 — William C. Woolston, 68 Post Street, Douglas 2-4600

Tulsa 3 — J. A. Hartley, 909 Enterprise Bldg., 522 South Boston, Gibson 7-5594

England, London E. C. 4 — E. E. Schirmer, McGraw-Hill Co., Ltd., 95 Farrington St.

What's in Petroleum Week for District Pipeline Superintendents?

A DISTRICT PIPELINE SUPERINTENDENT finds plenty in Petroleum Week. For Petroleum Week broadens the horizon of more than 45,000 men in the oil industry, at all levels and in all segments. It's the magazine where busy oil men keep informed, where they get up-to-the-minute reports on the news, technical developments, and trends that affect their daily activities. Out of this information they acquire the industry perspective so vital to doing a good job.

A good, responsible district pipeline superintendent has to keep informed, and that's why he likes Petroleum Week – oil's most readable magazine. He supervises the construction, operation and maintenance of the pipelines and gathering systems. He gets involved in a variety of purchasing decisions, and takes more than a passing interest in important tools of his trade.

District pipeline superintendents are among the many thousand subscribers to Petroleum Week who are actively and directly engaged in the pipeline segment of the industry.

Whether you want to reach superintendents or presidents, technical men or operating men, the pages of Petroleum Week can carry your advertising messages effectively, for all groups of buying influences are covered. That's why more and more companies are placing more and more advertising in this magazine in 1959.

PETROLEUM WEEK

Oil's Most Readable Magazine

All paid audited circulation

A McGraw-Hill Publication • 330 West 42nd Street, New York 36, N.Y.

One of a series of portraits of oil industry management and operating men.

District pipeline superintendent for major gas transmission company photographed near Houston by W. D. Murdy.

Oil's Meetings Aid Oil's Progress

IT WOULD BE DIFFICULT for any observer to "sell the oil industry short" in view of the four industry gatherings that are crowded together this month, and lapping into June.

The International Petroleum Exposition in Tulsa, which ended its ten-day run last week, was a striking testimonial to the development of new equipment and instruments designed to improve efficiency and reduce costs. The close working partnership between operating entities and equipment makers striving for improvements in efficiency have brought substantial benefits.

And starting this weekend in New York, the Fifth World Petroleum Congress offers a forum for the many technical developments around the world, plus another display of major new equipment developed by U.S. and foreign manufacturers.

THE MEETINGS OF THE CONGRESS will offer oil men in all operating phases a share of knowledge of the most recent significant trends, plus some prophecies of what the future may hold.

Sandwiched in between these "super" gatherings of oil men from all corners of the world are the API's Marketing Division meeting in Des Moines, Iowa, and the Refining Division meeting in New York, both of which end today. The various sessions of the latter meeting picked up an additional attendance from oil men arriving for the Congress.

ONE BIG BONUS TO BE DERIVED from all of the meetings is the opportunity they afford people in the industry to exchange ideas, in public and in private.

While there have been many developments in the industry's first 100 years that can be attributed to one person, or a small group working together, there have been many other significant scientific advances in petroleum's progress that can be traced to the exchange of information and ideas.

The most striking examples of such sharing of knowledge have been through the many committees of the API divisions, some of which met this week, in improving the standards of the multibranch petroleum industry. Similarly, many joint research projects conducted through API and supported by the industry generally have led to improved operations in many fields.

Only recently, for example, API was able to refute the comments of the U.S. Surgeon General on the industry's contribution to air pollution. API was able to point to both joint industry and individual-company research in the field of reducing air pollution, and win an immediate retraction—and, in fact, praise of the petroleum industry efforts.

New Jetting Tool To Clean Tube Bundles Saves Thousands Of Dollars

The new high-pressure hydraulic tool, shown above, is currently saving thousands of dollars for companies in the refining, chemical, and petrochemical industries. It is the jetting tool developed by Dowell to remove deposits from heat exchanger tube bundles.

Previous methods of cleaning these bundles have been costly, time-consuming and often inadequate. Many times bundles had to be replaced completely because of the lack of a suitable cleaning method.

This new Dowell tool has a remarkable record of thorough, fast cleaning. For example, a slurry reboiler exchanger bundle, three feet in diameter and 16 feet long, was fouled with deposits of coke and asphalt. After being jetted from only one side, the bundle was thoroughly clean. Time required: less than one hour.

The tool holds the bundle in place for cleaning and has flanged rollers for rotation. The jet-head is manipulated automatically so that all tube spaces are covered. The jetted liquid can be either water or chemical solvents.

This high-velocity jetting device is another example of the new ideas Dowell continues to offer in chemical cleaning to help you cut your costs. Whatever the cleaning problem in your plant, call Dowell for an engineered recommendation. Dowell — the largest, the oldest, the most experienced chemical cleaning service — Tulsa 1, Oklahoma; and 165 stations and offices in major industrial centers.

Chemical cleaning service for all industry DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

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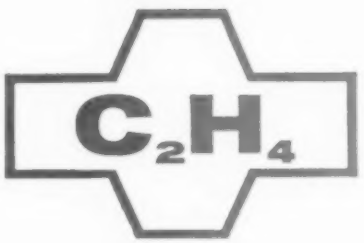

FRANCE

ITALY

U. S. A.

ENGLAND

ENGLAND

A BILLION-POUND BACKGROUND in Engineering Ethylene Plants

Leading oil and chemical companies on both sides of the Atlantic testify to the Kellogg Organization's ability to engineer ethylene manufacturing and recovery plants. The twelve for which Kellogg has been responsible to date represent an annual capacity in excess of 1,050,000,000 pounds!

Utilizing its high-efficiency steam-pyrolysis process, and many unique design features, Kellogg is unusually equipped to engineer and build economically sound plants for producing high purity ethylene and other valuable olefins from various feed-stocks.

Typical Kellogg design innovations for ethylene recovery systems are: (1) a heat pump circuit which permits tower top reflux to be provided by condensing overhead vapors while doing tower reboiler duty; (2) an auto-refrigeration system based on a Joule-Thompson or Isentropic expansion of tower overhead vapors; and (3) an intermediate condenser and reboiler on the demethanizer to minimize refrigeration requirements.

When considering ethylene plants, call on the billion-pound background of The M.W. Kellogg Company.

THE M. W. KELLOGG COMPANY
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M KELLOGG W